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AMERICAN INSTITUTE OF PHYSICS

AIP REPORT

EDUCATION & EMPLOYMENT STATISTICS DIVISION

1989 SALARIES: SOCIETY MEMBERSHIP SURVEY

THE AMERICAN INSTITUTE OF PHYSICS

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1989 SALARIES:

SOCIETY MEMBERSHIP SURVEY

Dawn Kellman and Catherine Scholz

The American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society
American Geophysical Union

COVER (1)

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry, government, and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

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INTRODUCTION

By 1989 the median salary of society members rose to $52,500. Among PhDs, who comprise two-thirds of the membership, the median salary rose to $55,200. These figures represent apparently small increases over previous levels, reflecting a dampening trend in salary compensation.

Overall figures, however, supply only part of the picture. Society members are a diverse group. By and large, members identify themselves as physicists. But engineers, chemists, and astronomers are also well represented, as are scientists working in related disciplines. In addition, as indicated in Figure 1, members are employed in many sectors of the economy. Among older society members, academic employment is most common, whereas younger society members are more likely to be employed outside academe.

Salaries vary widely by degree level, employment sector, geographic location and work activity. This report examines these variations in some detail. The data are based on a stratified random sample of one-sixth of the U.S. membership of the AIP Member Societies. Of the approximately 14,400 members who were queried in March 1989, 64% responded.

Salaries reported by members of nine of AIP's ten Member Societies are discussed in the main body of this report. AIP's newest Member Society, the American Geophysical Union (AGU), is examined separately in the final section. Data in this section are based on a random sample of AGU's "regular members" and cannot be compared to published 1987 AGU data. The 1987 salary data were based on responses from fellows, life-time and student members, as well as "regular members."

Most of the analyses presented here are based on median and quartile salaries, which are the preferred descriptive measures of central tendency in typically skewed salary distributions. Mean salaries, standard deviations and median ages are also presented for comparative purposes. See Appendix B for definitions and technical notes on the measures used in this report.

One note of caution: a significant difference exists between the data presented in this report and previously published data. Since the survey's inception in 1979, respondents have been asked to provide their annual salary, not including benefits or pensions. In 1989 the questionnaire was refined; respondents were asked to provide their principal salary, excluding not only benefits and pensions, but also excluding income derived from summer teaching, bonuses or overtime pay. Although this rephrasing provides a more accurate picture of primary salaries, it also tends to depress 1989 salaries with respect to earlier published figures, making exact comparisons with earlier data inappropriate, particularly in the academic sector.

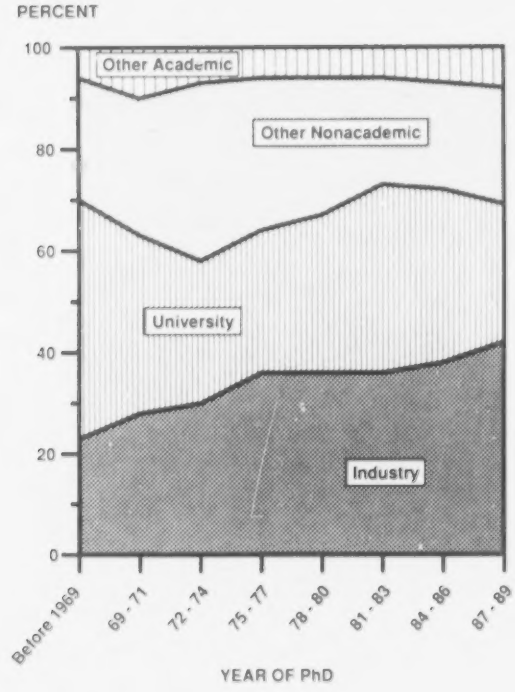

Figure 1. Current employer type by year of PhD, 1989. Does not include members of the American Geophysical Union.

Comparisons of data over time will, however, be possible in future salary reports using the refined definition of income. This clarification of the questionnaire will allow us to analyze in close detail the effect an increasingly recessionary climate has had on society members' salaries.

Readers seeking more in-depth information are encouraged to contact the Education and Employment Statistics Division.

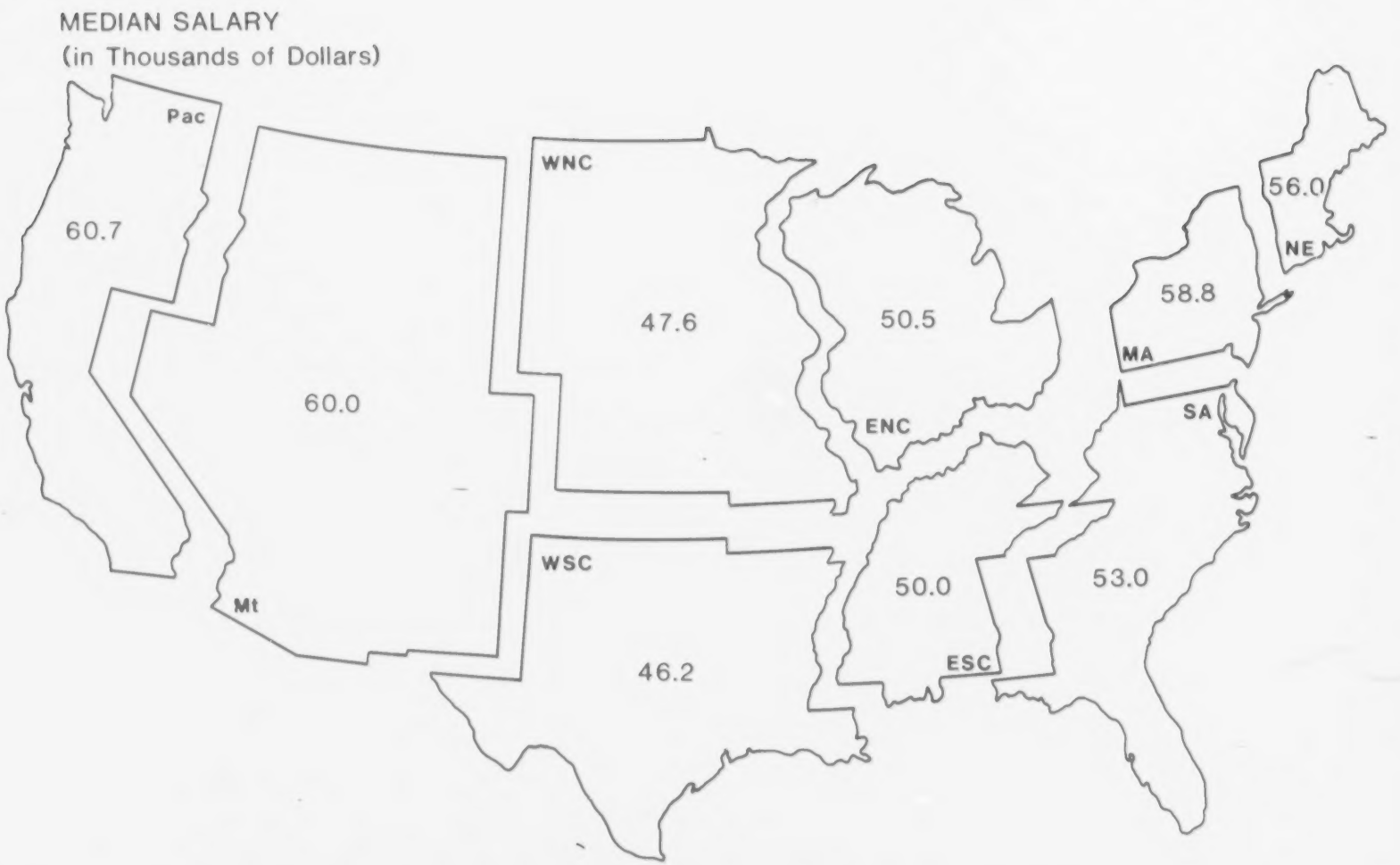

Figure 2. Variation in median salary for PhDs by geographic division, 1989.

Table 1. 1989 salaries by geographic division, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
New England	56.0	58.3	23.7	44	402
Middle Atlantic	58.8	61.7	25.3	45	739
South Atlantic	53.0	55.5	19.5	46	710
East North Central	50.5	53.2	21.3	46	514
East South Central	50.0	51.3	17.2	46	153
West North Central	47.6	52.4	24.2	45	167
West South Central	46.2	50.3	21.9	45	232
Mountain	60.0	59.6	19.4	46	350
Pacific	60.7	63.0	24.4	44	826

[a] *See Appendix A for state composition of each division.*

SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

• Salary levels vary widely among the geographic divisions of the U.S. The three main factors contributing to these differences are (1) the distribution of employment sectors within each division; (2) the salary structure for each employer type; and (3) age variations across geographic locations.

• From one part of the country to the next, industrially employed society members earn more than their academically employed colleagues. The gap between median salaries in industry and academe ranges from a low of $14,000 in the West North Central to $21,000 in the West South Central.

• Despite the fact that they are among the youngest of all society members, residents of the Pacific division report earning the highest median salary nationwide, $60,700. This is mainly due to the heavy concentration of private sector employment in California, the most populous state in the division. Industry accounts for roughly 40% of all employment in the Pacific, a larger proportion than anywhere else in the U.S.

Table 2. 1989 salaries by selected employment sector and geographic division, PhDs.

	Academic			Industry			Other		
	Median Salary	Median Age	%	Median Salary	Median Age	%	Median Salary	Median Age	%
New England	48.0	45	51	65.0	44	30	57.0	41	19
Middle Atlantic	49.0	47	43	66.4	42	45	59.0	45	12
South Atlantic	43.9	47	38	56.0	43	20	60.0	47	42
East North Central	45.0	48	62	60.0	44	20	55.0	43	18
East South Central	39.5	46	50	*	*	9	59.8	47	41
West North Central	42.0	48	65	56.0	41	26	*	*	9
West South Central	41.0	47	67	62.0	43	23	*	*	10
Mountain	43.0	47	32	60.0	46	14	65.0	45	54
Pacific	50.0	46	33	65.0	43	39	63.6	44	28
Overall	45.0	47	45	63.5	43	29	60.0	45	26

**Number of respondents was too small to calculate reliable medians.*

• With a median annual salary of $60,000, members employed in the Mountain states report earnings which are second only to those in the Pacific. This high level of compensation can be attributed to the presence of large, well paying national laboratories in New Mexico, including Los Alamos National Laboratory and Sandia National Laboratory.

• Approximately two out of every three members who reside in the West South Central and West North Central are employed in academe. This proportion of academics is larger than that in any other part of the country, and accounts for the relatively low salaries reported in these divisions.

• The Middle Atlantic is comprised of three very disparate states. New Jersey tends to be heavily industrial, with two out of every three members working in an industrial setting. In Pennsylvania the situation is reversed: two-thirds of all members working in this state are in an academic environment. The New York employment scene is evenly split between academic and nonacademic sectors.

Table 3. 1989 salaries and employment sector distribution for selected states, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	Academic %	Industry %	Gov't %	FFR&DC %	Other %
Alabama	40.5	47.3	18.5	45	40	65	16	12	–	7
Arizona	52.0	52.2	18.2	45	42	69	19	1	9	2
California	62.0	64.8	24.5	44	730	28	41	4	22	5
Northern	63.0	65.5	23.0	43	357	25	35	4	30	6
Southern	61.0	64.1	25.9	45	372	32	47	5	13	3
Colorado	53.0	56.6	22.5	47	62	42	33	14	8	3
Connecticut	56.5	56.8	19.4	45	67	50	39	5	–	6
Delaware	50.0	54.1	17.7	41	28	21	69	–	–	10
DC	59.7	59.0	15.2	47	141	10	4	78	1	7
Florida	45.0	50.3	21.0	43	84	69	19	8	–	4
Georgia	42.0	48.5	20.7	47	41	83	12	–	–	5
Illinois	52.1	54.9	20.6	43	164	46	19	1	27	7
Indiana	42.0	46.8	17.6	45	63	92	8	–	–	–
Iowa	48.4	52.7	20.4	48	29	86	4	–	7	3
Louisiana	36.0	38.9	13.6	47	33	93	3	1	–	3
Maryland	56.7	57.4	19.4	46	212	25	24	42	2	7
Massachusetts	56.2	59.8	24.6	43	284	49	29	8	8	6
Michigan	56.0	59.6	30.7	48	92	60	29	–	–	11
Minnesota	50.2	56.0	21.8	42	58	47	47	–	2	4
Missouri	46.2	52.4	30.5	48	50	66	22	–	–	12
New Jersey	62.0	66.6	24.6	42	211	21	67	5	4	3
New Mexico	65.0	65.0	17.6	45	192	12	7	2	78	1
New York	59.8	61.8	25.9	47	371	45	41	1	8	5
Northern	55.0	57.7	21.8	46	182	57	39	2	–	2
Southern	63.0	65.7	28.9	48	189	34	42	–	16	8
North Carolina	45.0	48.5	17.5	48	51	78	12	6	–	4
Ohio	51.5	52.0	16.0	48	136	60	20	14	1	5
Oklahoma	43.0	45.5	16.3	43	22	68	28	2	–	2
Oregon	42.5	45.7	23.8	47	29	87	10	–	–	3
Pennsylvania	53.1	55.1	23.2	45	157	66	26	4	2	2
South Carolina	42.5	48.3	17.2	49	22	78	20	–	2	–
Tennessee	51.1	53.7	17.0	46	86	39	8	1	51	1
Texas	51.0	53.7	23.2	44	169	61	28	2	–	9
Virginia	57.0	60.3	21.6	46	118	35	27	22	12	4
Washington	50.0	50.5	15.8	46	56	53	34	1	9	3
Wisconsin	45.0	47.8	16.5	47	57	79	18	–	–	3

[a] *Several states were not included above because the number of respondents was too small to calculate reliable statistics.*

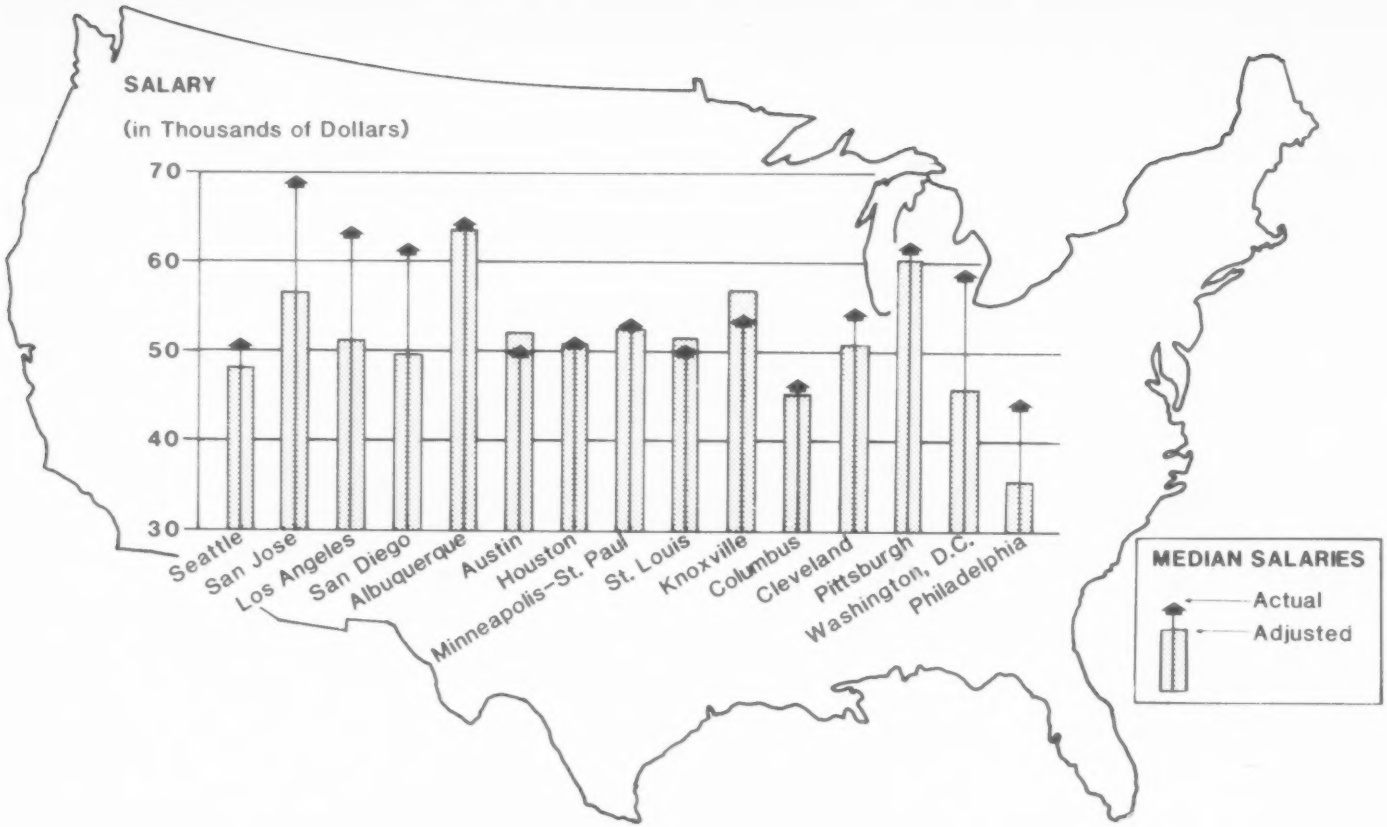

Figure 3. Median salaries for PhDs in selected metropolitan areas, 1989. Both actual salaries and salaries adjusted for cost of living are presented.

• The cities listed in Table 4 volunteered to participate in a survey conducted by the American Chamber of Commerce Researchers Association (ACCRA). The survey was developed to "provide a useful and reasonably accurate measure of living cost differences among urban areas." Certain large cities, such as New York, Chicago and San Francisco, are notably absent from the table. These cities opted not to respond to the ACCRA survey.

• The cost of living index presented in Table 4 reflects relative price levels for a market basket of consumer goods and services during the first quarter of 1989. The national average is set at 100; all indexes above 100 represent a relatively high cost of living, while those below represent a relatively low one.

Table 4. 1989 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.[a]

	Cost of Living Index	Median Salary	Adjusted Salary	Median Age	Academic %	Non-Academic %	Total Number Known
Albuquerque	102.3	65.0	63.5	46	16	84	64
Austin	95.9	50.2	52.3	43	82	18	44
Cleveland	108.7	55.0	50.6	49	47	53	29
Columbus	104.0	47.0	45.2	49	86	14	24
Houston	101.7	51.0	50.1	42	50	50	46
Knoxville	95.4	54.2	56.8	47	26	74	66
Los Angeles	124.4	64.0	51.4	45	30	70	122
Minneapolis–St. Paul	101.7	53.4	52.5	41	45	55	50
Philadelphia	127.2	45.0	35.4	43	71	29	49
Pittsburgh	103.9	62.4	60.1	48	47	53	36
St. Louis	98.9	51.0	51.6	47	42	58	25
San Diego	124.5	62.0	49.8	46	24	76	74
San Jose	123.0	69.4	56.4	42	13-	87	47
Seattle	106.4	51.0	47.9	45	66	34	29
Washington, D.C.	129.8	59.7	46.0	47	10	90	141

[a] *Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0.*

Adjusted salary $= \frac{\text{Median Salary}}{\text{cost of living \%}}$

• There is a direct relationship between the population size and the cost of living of a metropolitan area. Society members tend to reside in large expensive urban areas where employment opportunities are most likely to be found for physicists with advanced training. Consequently, only three cities listed in Table 4 have a cost of living below the national average: Austin, Knoxville, and St. Louis.

• In several cities, the cost of living is so high that although society members' median reported salaries are above the national average of $55,200, their adjusted salaries, which take expenses into account, fall below the national average. This is true of Los Angeles, San Diego, and Washington, DC. Although not a respondent to the 1989 ACCRA survey, New York City has also traditionally been ranked among the most expensive urban centers in the nation.

• Members residing in Albuquerque, Knoxville, Pittsburgh and San Jose maintain adjusted salaries above the national median. In Albuquerque and Knoxville, a high proportion of nonacademic employment, in combination with reasonable living expenses, translates into high median adjusted salaries. In San Jose, industrial employment pays so well that, despite a very high cost of living, members manage to retain strong spending power.

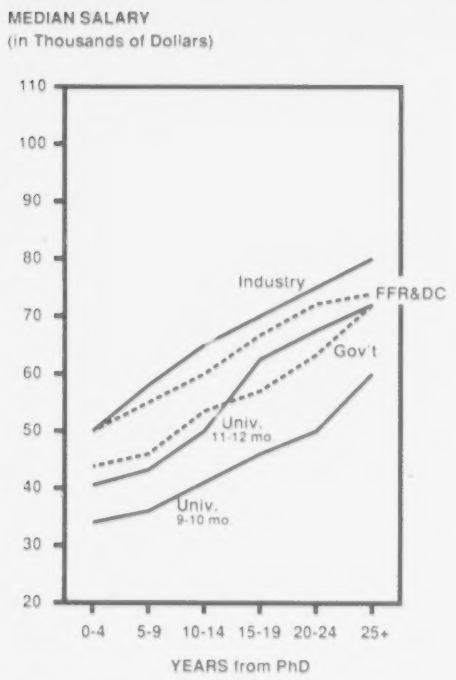

Figure 4. Median salaries by type of employer and years from PhD, 1989.

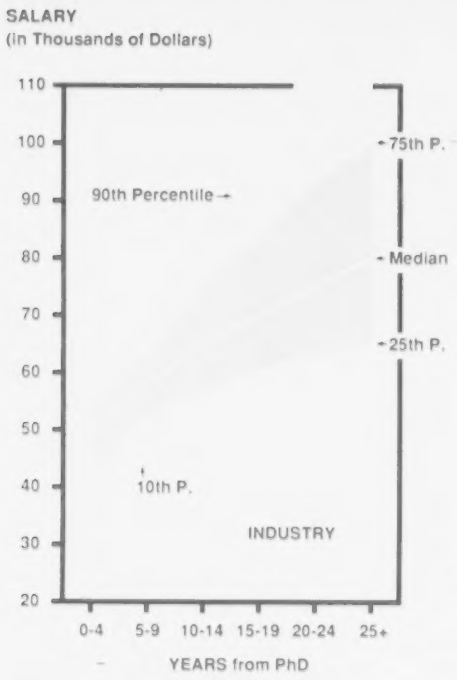

Figure 5. Salary structure in industry by years from PhD, 1989.

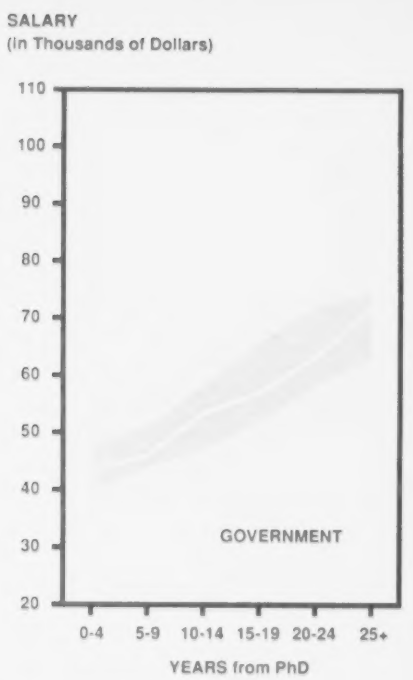

Figure 6. Salary structure in government by years from PhD, 1989.

SALARIES AND EMPLOYMENT SECTOR FOR PhDs

- PhDs comprise over two-thirds of the society membership. In 1989, the median salary reported by society members with doctorates was $55,200. This figure represents a 8.2% increase over the 1987 median of $51,000. Rates of compensation vary widely with employment sector. In 1989, median salaries ranged from $36,600 in four-year colleges with a 9–10 month base to $63,500 among industrially employed society members.
- Each occupational sector has its own unique salary distribution. At lower levels of experience, salaries in all sectors fall into a fairly narrow range, increasing steadily for the first 15 years after receipt of doctorate. After 15 years of professional experience, however, median salaries level off and variations both within and among the occupational sectors become increasingly pronounced.
- Recent doctorate recipients working in industry and at the national laboratories command the highest starting salaries, $50,000 in 1989. By comparison, those starting their careers in government received a lower median salary of $43,800. University salaries are lower still, ranging from $34,000 to $40,500 depending on salary base.
- At entry level, the distribution of salaries in industry is fairly narrow, resembling that of other employment sectors. However, at more experienced levels, industrial salaries fall into a wider range than salaries in any other sector, reflecting the variety of career paths—from research to administration—available to individuals in the private sector. Some PhD's with 20 or more years of experience command salaries upwards of $120,000.

Table 5. 1989 salaries by major employment sector, PhDs.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
University					
9–10 Month Salary	48.0	50.4	16.0	49	910
11–12 Month Salary	46.0	51.3	25.2	41	637
4-Year Colleges					
9–10 Month Salary	36.6	37.9	10.6	48	160
Industry/Self-Employed	63.5	69.0	25.8	43	1163
Government	56.0	56.9	13.1	47	368
FFR&DC	63.0	63.9	17.1	44	511
Nonprofit	59.0	59.5	23.1	44	117
Hospital	52.0	53.5	23.6	42	76

Table 6. 1989 salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	38.0	38.6	12.7	32	645
5–9	49.0	48.8	15.0	36	646
10–14	55.0	56.9	18.3	41	608
15–19	61.1	62.1	19.5	46	684
20–24	63.0	66.2	26.2	50	655
25–29	65.0	68.0	22.9	55	414
30 +	70.0	72.8	25.5	62	431

Table 7. 1989 industrial salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	41.0	45.0	50.0	54.6	59.6	50.2	8.3	32	172
5–9	45.0	53.0	58.0	63.0	70.5	58.5	10.7	36	227
10–14	50.0	57.0	65.0	75.0	85.0	67.6	19.1	42	212
15–19	53.0	61.1	70.0	84.0	95.0	73.7	19.9	46	192
20–24	54.5	63.4	75.0	93.0	120.0	84.1	35.9	51	159
25 +	56.0	65.0	80.0	100.0	120.0	85.3	32.4	59	184

[a] *In addition, there were 13 postdoctorates in the 0–4 years from degree group with a median salary of $40,500.*

Table 8. 1989 government salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	36.0	40.0	43.8	48.0	52.0	44.2	8.4	34	34
5–9	38.0	43.9	46.0	51.0	62.1	47.8	9.3	37	44
10–14	41.5	47.3	53.5	58.3	64.0	53.4	9.2	42	53
15–19	48.4	52.0	57.0	66.0	73.0	59.0	9.2	47	86
20–24	50.0	58.3	63.3	72.0	75.0	63.9	11.3	50	61
25 +	53.0	63.0	72.0	74.5	76.0	68.2	9.2	59	72

[a] *In addition, there were 15 postdoctorates in the 0–4 years from degree group with a median salary of $33,500.*

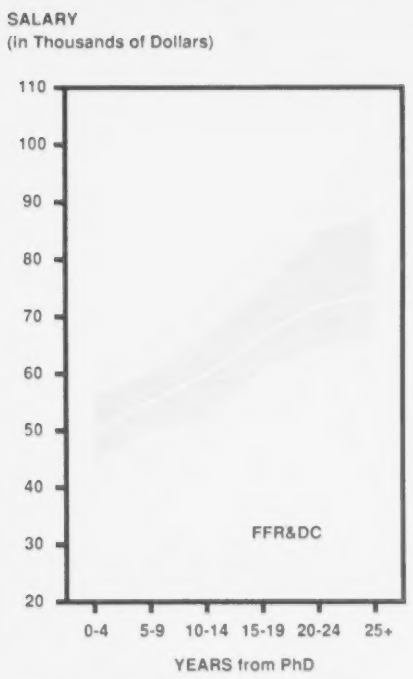

Figure 7. Salary structure in the national laboratories by years from PhD, 1989.

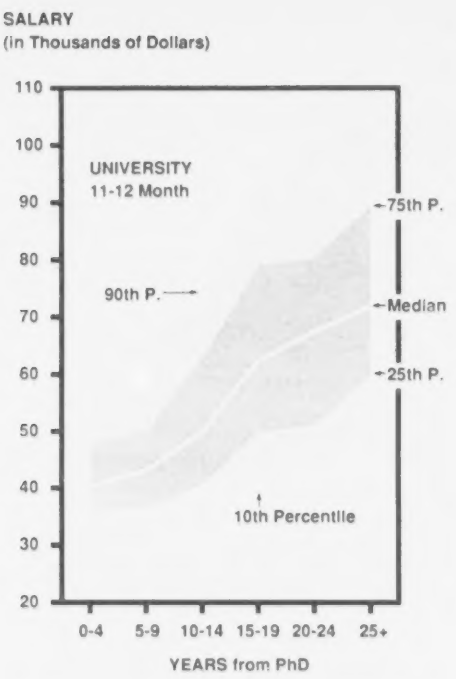

Figure 8. Salary structure in universities for 11–12 month salary base, by years from PhD, 1989.

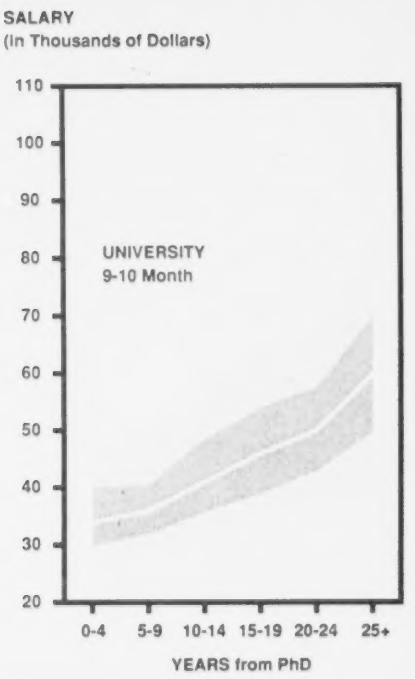

Figure 9. Salary structure in universities for 9–10 month salary base, by years from PhD, 1989.

• Salaries at the national laboratories, at a median of $63,000, lag slightly behind those in industry. However, the gap between the two medians has shrunk from $3,100 in 1987 to only $500 in 1989. Top salaries of experienced administrators at the national labs have passed the $100,000 mark but are still 15% below top industrial levels.

• At all levels of experience, PhDs in government receive lower salaries than individuals in industry and the national labs. The government salary structure differs from that in other employment sectors in that the range at upper levels of experience is quite narrow. This is due largely to federal salary ceilings and the use of civil service schedules in salary determination. According to the U.S. Office of Personnel Management, government employees working in physics in 1989 were classified on average as grade 13 on the General Schedule.

• Academics employed on an 11–12 month base typically receive salaries comparable to those in government. In contrast to the government salary structure, however, the academic salary range expands slowly and at a regular rate, broadening at the highest levels of experience. Individuals employed in universities on an 11–12 month pay base have a slightly higher and wider pay scale than their colleagues on a 9–10 month base, reflecting the variety of positions—including administration, non-faculty university staff, and faculty on year-round federal grants—available in such institutions.

Table 9. 1989 FFR&DC salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	40.0	45.0	50.0	56.0	60.0	50.4	8.5	32	47
5–9	45.0	50.0	55.0	60.0	66.4	55.5	8.0	37	63
10–14	48.9	52.0	60.0	66.8	73.3	59.9	10.6	41	93
15–19	55.0	61.0	66.7	75.0	82.0	68.2	12.4	45	106
20–24	60.4	65.0	72.1	85.0	92.0	74.6	14.0	50	79
25 +	63.5	66.0	73.9	87.5	102.0	78.0	15.7	58	88

[a] *In addition, there were 30 postdoctorates in the 0–4 years from degree group with a median salary of $30,000.*

Table 10. 1989 university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	30.0	36.0	40.5	48.0	57.7	42.5	9.9	32	53
5–9	34.0	36.6	43.2	50.0	66.6	45.7	12.7	36	88
10–14	35.3	40.8	50.0	63.0	74.3	53.4	16.5	41	70
15–19	40.0	50.0	62.5	79.1	92.0	65.6	21.1	46	78
20–24	43.0	51.1	67.5	80.4	100.0	69.2	22.9	50	91
25 +	50.0	60.0	72.0	89.5	108.0	77.2	25.1	58	92

[a] *In addition, there were 140 postdoctorates in the 0–4 years from degree group with known salaries working in universities on an 11–12 month salary base. Their median salary was $25,000.*

Table 11. 1989 university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	25.8	30.0	34.0	40.2	45.0	35.1	7.0	32	60
5–9	29.0	32.0	36.0	40.5	50.0	37.4	7.5	36	124
10–14	32.0	35.8	41.0	48.5	55.0	43.4	11.0	40	107
15–19	35.0	39.0	46.0	54.0	65.1	48.3	12.3	45	120
20–24	37.5	43.0	50.0	57.6	68.4	52.3	13.5	50	180
25 +	40.0	49.9	60.0	70.0	84.0	60.9	16.1	59	313

[a] *Postdocs excluded.*

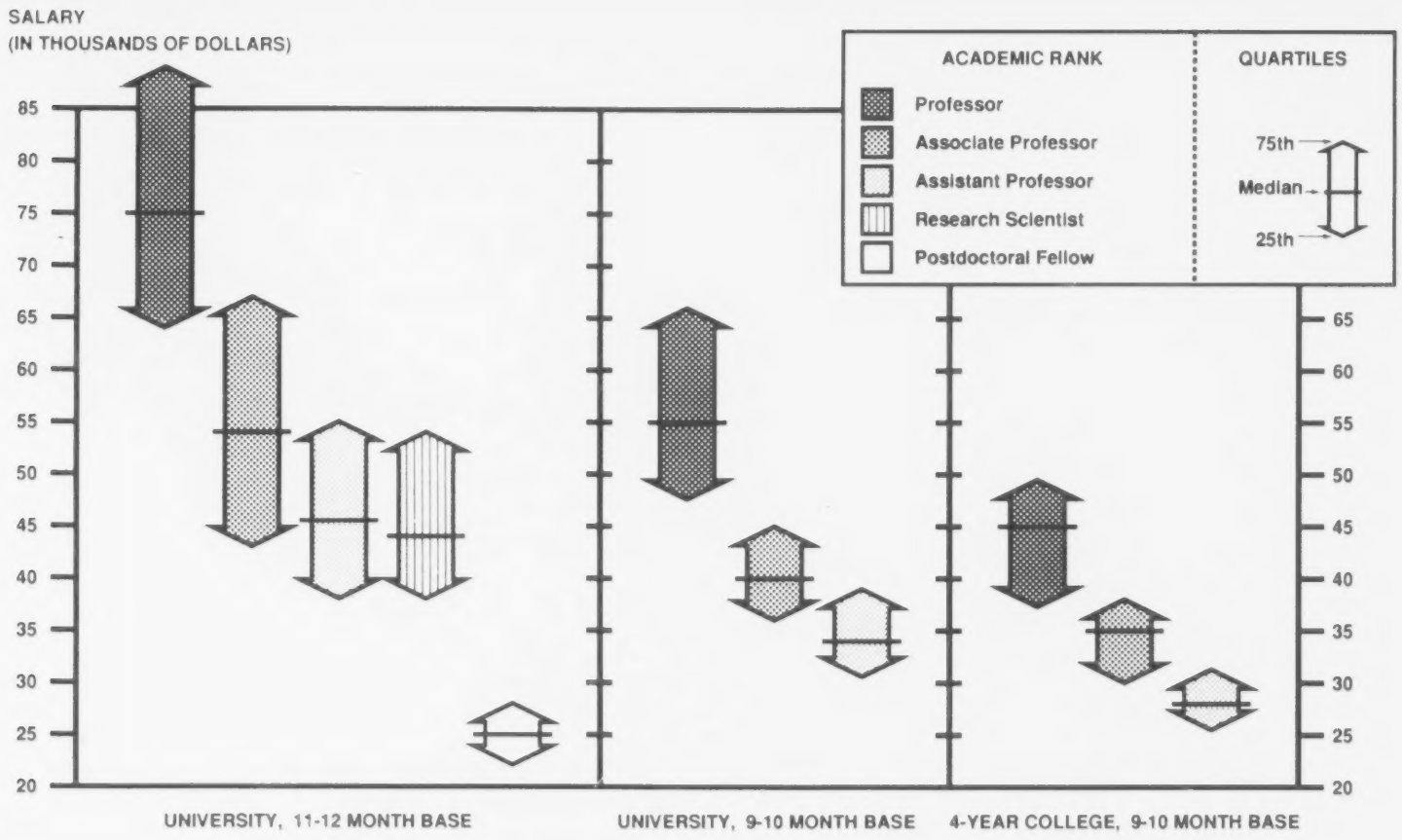

Figure 10. University and 4-year college salaries for PhDs by academic rank, 1989.

Salaries and Academic Rank

- Approximately 45% of society members with doctorates are employed in academe. Compared to their colleagues in other sectors, academics tend to be somewhat older and to be paid at a lower rate.

- Academic salaries vary a great deal among institutions, ranks, and subfields. University full professors employed on an 11–12 month salary base receive the widest range of salaries: between $64,000 and $89,000, on average, in 1989. This range reflects the variety of activities, from administration to grant-funded research, available to university professors. The highest salaries are earned by individuals holding appointments at university-affiliated hospitals or teaching in medical schools.

- Postdoctoral fellows receive the lowest median salary in academe, $25,000 in 1989. Although salaries for this group increased substantially in the mid-1980's, the median postdoctoral salary grew only 4% between 1987 and 1989 and appears to have stabilized. Fellows employed outside of academe earn somewhat higher salaries than their academic counterparts.

Table 12. 1989 university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)						
Professor							
9–10 Month Salary	47.6	55.0	66.0	58.1	14.8	54	546
11–12 Month Salary	64.0	75.0	89.0	78.2	22.2	51	176
Associate Professor							
9–10 Month Salary	36.0	40.0	45.0	41.2	7.6	43	183
11–12 Month Salary	43.0	54.0	67.0	57.7	19.3	45	63
Assistant Professor							
9–10 Month Salary	30.6	34.0	39.0	34.8	6.0	34	160
11–12 Month Salary	38.0	45.5	55.0	47.4	12.1	35	70
Research Associate (11–12 Month Salary)							
Postdoctorates	22.1	25.0	28.0	25.2	3.9	32	164
Other Research Staff	38.0	44.0	54.0	47.0	13.3	39	146

Table 13. 1989 4-year college salaries by selected academic rank on 9–10 month salary base, PhDs.

	25th	QUARTILE SALARIES Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)						
Professor	37.3	45.0	49.5	44.5	10.5	52	80
Associate Professor	30.0	35.0	38.0	34.3	5.2	43	42
Assistant Professor	25.5	28.0	31.3	28.4	3.9	37	37

• The academic rank of research scientist combines aspects of both professorial and postdoctoral positions. Research scientists earn salaries comparable to those earned by assistant professors, although they are somewhat older. Furthermore, like postdoctoral fellows, they have few teaching responsibilities and are not eligible for tenure. In many cases, research scientists hold "soft money" positions which are dependent upon grants and other short term funding.

• Median salaries in four-year colleges ranged according to rank from $28,000 to $45,000 in 1989. These salaries are roughly 14–22% lower at each professorial rank than salaries earned by individuals employed in universities on a 9–10 month salary base.

• Based on data from over 750 colleges and universities nationwide, the College and University Personnel Association reports that physics faculty salaries are above the overall average salaries paid to all academics. In general, members of physics departments, like those throughout the physical sciences, earn more than their colleagues in education, the social sciences and the humanities. Faculty in accounting and engineering departments earn the highest average salaries, due, in part, to the fierce competition for young employees in these fields.

• In 1982, the median age of society members with a rank of full professor was 50. Since then, this figure has increased to over 53. As physics faculty reach retirement age in the mid-1990's, the dearth of younger assistant professors may affect the quality of both education and research. Conversely, the tight academic labor market may open up, creating a broader range of professional opportunities for individuals seeking academic careers.

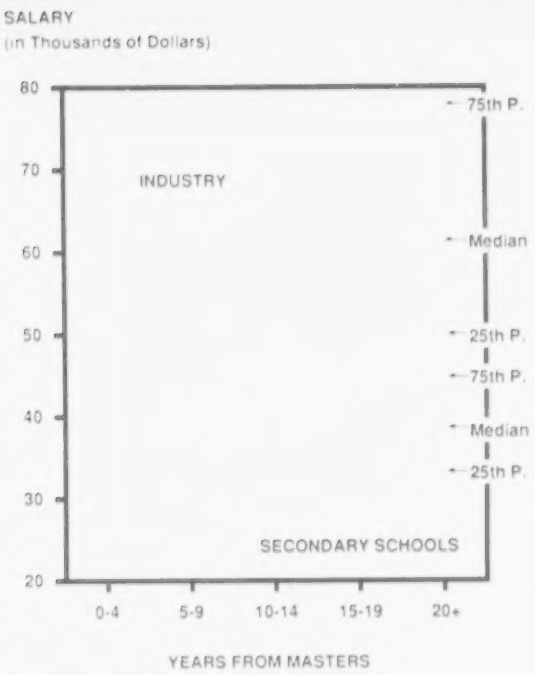

Figure 11. Salary structure in industry and secondary schools by years from Masters degree, 1989.

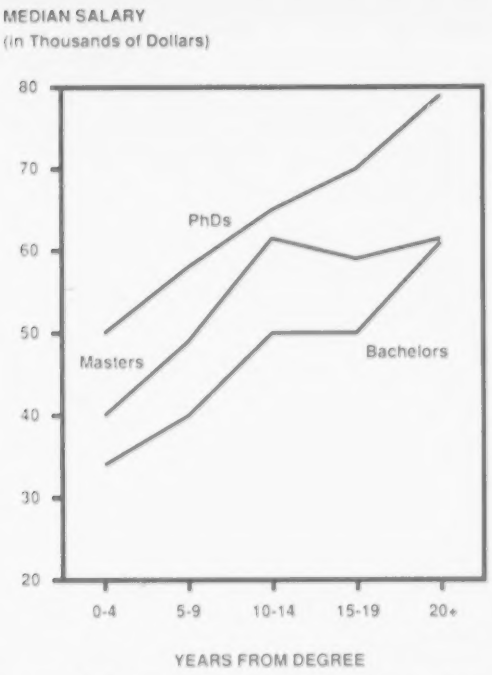

Figure 12. Median salaries in industry by degree level and years from degree, 1989.

SALARIES FOR MASTERS AND BACHELORS

- Nearly one-third of society members who hold exclusively masters or bachelors degrees are graduate students pursuing advanced training. There are, however, a sizeable number of non-student masters and bachelors degree recipients in physics employed by industry, secondary schools and government.

- Industry and secondary schools are the two largest employers of society members with masters degrees. The disparity in payscale between industry and secondary schools is striking. At the lowest levels of experience, high school teachers earn an average of $15,000 less than their colleagues in industry. This gap widens to $30,000 among those 10–14 years from degree. In fact, median starting salaries in industry are higher than median salaries for society members in secondary schools with 20 or more years of experience.

- Industry employs nearly 60% of society members holding only bachelors degrees. It is also the only sector with enough members at each educational level to permit a comparison of salaries across degree. As a general rule, the more advanced the degree, the larger the median salary. For example, at entry level a bachelor earns an average of $34,000, a masters $40,000 and a PhD $50,000.

- Salary tables discussing lower degree holders must be interpreted with caution. Lower degree holders are poorly represented in the membership and those who are members tend to be atypical, with a special interest in specific society programs. In fact, the majority of masters and bachelors degree holders in the membership are advanced graduate students who are not included in these salary analyses.

Table 14. 1989 salaries by selected employment sector, Masters.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
Junior College	35.5	36.1	8.7	49	67
Secondary School Teachers	33.5	34.3	9.3	46	225
Industry: Self-Employed	53.0	56.8	19.7	40	391
Government	47.5	48.4	12.0	43	81
FFR&DC	54.5	55.9	15.8	44	36
Hospital	51.0	54.0	16.0	38	57

Table 15. 1989 salaries by selected employment sector and years from degree, Masters.

	Years from Degree	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
		(in thousands of dollars)						
Secondary School (teachers only)	0–4	21.2	25.0	30.3	26.3	6.4	38	34
	5–9	25.0	32.0	36.0	31.2	7.5	39	27
	10–14	27.0	32.0	38.0	32.4	8.5	43	39
	15–19	30.0	33.9	42.3	36.1	8.3	46	58
	20 +	33.4	38.5	45.0	39.2	9.1	51	66
Industry: Self-Employed	0–4	35.0	40.0	45.7	41.7	9.3	30	78
	5–9	43.5	49.0	57.3	51.0	12.9	33	79
	10–14	49.5	61.5	70.0	61.4	18.1	38	67
	15–19	50.0	59.0	69.0	62.6	21.3	44	49
	20 +	50.0	61.5	78.0	66.2	21.6	55	116

Table 16. 1989 industrial salaries by years from degree, Bachelors.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	34.0	33.8	7.2	27	37
5–9	40.0	39.9	10.9	31	53
10–14	50.0	51.4	17.2	35	34
15–19	50.0	51.0	13.9	41	26
20 +	61.0	63.6	23.8	55	75

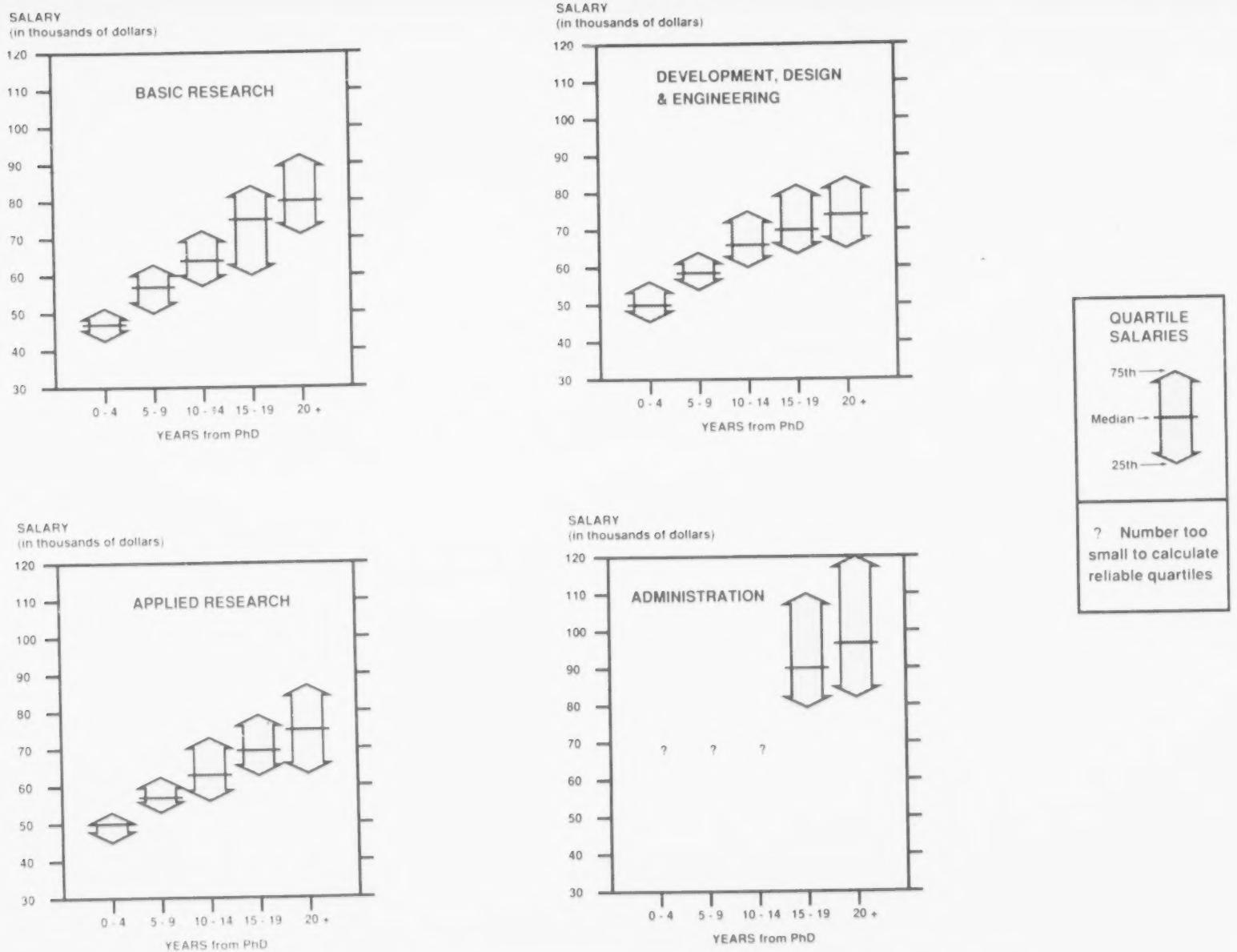

Figure 13. Industrial salaries by principal work activity and years from PhD, 1989.

Table 17. 1989 industrial salaries by primary work activity and years from degree, PhDs.

Years from Degree	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Basic Research							
0–4	42.6	47.0	51.3	47.9	8.9	31	38
5–9	50.0	57.0	63.0	57.9	11.7	35	37
10–14	57.2	64.0	72.0	65.3	15.5	40	25
15–19	60.0	75.0	84.0	71.9	15.1	45	20
20 +	71.0	80.0	92.3	80.1	16.6	55	38
Applied Research							
0–4	45.0	50.0	53.0	49.9	8.0	32	89
5–9	53.0	57.0	62.5	57.5	7.9	36	101
10–14	56.0	63.0	73.0	65.1	12.3	42	87
15–19	62.7	69.5	79.0	71.0	13.0	46	74
20 +	63.1	75.0	87.0	78.8	21.3	55	133
Development, Design, and Engineering							
0–4	45.5	50.0	56.2	50.7	9.2	31	46
5–9	54.0	58.5	64.0	59.5	9.1	36	70
10–14	60.0	66.0	75.0	67.4	17.6	42	65
15–19	63.5	70.0	82.0	72.4	16.5	46	56
20 +	65.0	74.0	84.0	79.3	23.2	54	74
Administration							
0–4	*	*	*	*	*	*	0
5–9	*	*	*	*	*	*	4
10–14	*	*	*	*	*	*	14
15–19	79.3	90.0	110.0	97.0	33.5	46	18
20 +	82.0	96.6	120.0	110.1	55.2	55	57

*Number of respondents too small to calculate reliable quartiles.

SALARIES AND PRIMARY WORK ACTIVITY

- Although salaries are influenced most by employment sector and years of experience, they also reflect the type of work performed. The widest range of work activities, as well as the widest range of salaries, exists in the industrial sector, which employs nearly 30% of society members holding doctorates.

- Median starting salaries for doctorates in industry fall into a fairly narrow range, regardless of work activity. In 1989, individuals with less than five years of work experience reported median salaries ranging from $47,000 for basic research to $50,000 for applied research, development, design and engineering.

- In addition to beginning their careers on par with one another, doctorates engaged in non-administrative industrial posts generally earn comparable salaries throughout their careers. However, a small cohort of professionals who work in basic research and who have been in the labor force for 15 years or more appear to be earning slightly higher salaries than their colleagues involved in more applied endeavors.

- Society members typically enter administrative positions after they have had 15 or more years of experience in the labor force. These individuals earn substantially more than their colleagues outside of administration, with median salaries $15,000 or more above the salaries of comparably experienced individuals employed in non-administrative positions.

Table 18. 1989 industrial salaries by sex and years from degree.

	Median Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
YEARS FROM DEGREE				
0–4				
Male	46.0	10.3	31	257
Female	43.5	10.1	30	45
5–9				
Male	55.0	13.3	35	334
Female	51.6	13.5	35	30
10 -				
Male	68.0	27.2	48	1116
Female	55.4	17.1	43	31

PhD SALARIES FOR MALES AND FEMALES

• Among society members, only 6% of PhDs and 12–13% of Masters and Bachelors are women. The representation of women has increased somewhat since the early 1980's, especially at the lower degree levels. In 1983, for example, less than 5% of PhDs and 7–8% of Masters and Bachelors were women. (The American Geophysical Union, which has a higher proportion of women than the other Member Societies, joined AIP in 1987 and is not included in these figures.)

• In general, males with doctorates earn higher salaries than their female counterparts. This difference in salary is due in part to the fact that men have been out in the workforce longer. However, age and experience do not account for the disparity completely. Other factors which may contribute to the difference include employment patterns, career paths, and discrimination.

• When compared to men, women are less likely to be employed in industry or the national laboratories and more likely to work for secondary schools. Only one quarter of female society members, as opposed to one-third of males, work in industry. Conversely, secondary schools employ approximately 18% of female society members, compared to less than 5% of the males. Some, but not all, of the variation in employment sector by gender can be attributed to the fact that a higher percentage of male society members have doctorates.

Table 19. 1989 university salaries by sex and years from degree.

	Median Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
YEARS FROM DEGREE				
0–4				
Male	38.0	9.5	32	111
Female	35.0	10.5	31	15
5–9				
Male	39.0	11.6	36	205
Female	35.0	8.6	37	23
10 -				
Male	54.4	19.8	51	1088
Female	46.0	15.1	48	62

• In industry, the largest gap in compensation occurs at the highest levels of experience; in 1989, men who had been in the labor force for over 10 years received a median salary $12,600 over that of women of the same cohort. This disparity results in part from the fact that women at this level are five years younger, on average, than their male colleagues and are less likely to hold top-paying administrative positions. At lower levels of experience in industry, men also receive slightly larger salaries than women, although the difference is less marked.

• The disparity between men's and women's salaries in academe follows a pattern similar to that of industry. At lower levels of experience, the salary differential is small, $3,000 –$4,000, and men are only slightly older than women. Among academics with ten or more years of experience, the gap between men's and women's earnings grows to $8,400. Age is one factor contributing to this difference; men are three years older than women in this group. Some of the disparity may also be due to the fact that, at this level of experience, a larger proportion of men than women are full professors. However, even after adjusting for differences in age and academic rank, men's salaries still outpaced women's.

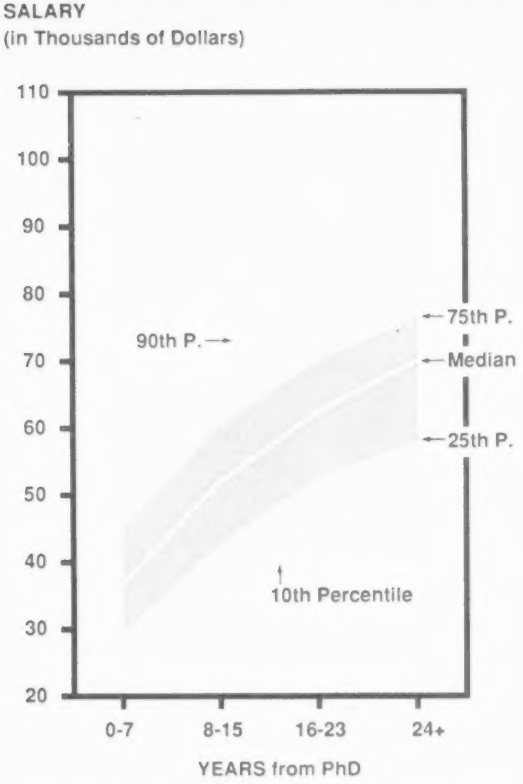

Figure 14. Salary structure by years from PhD, 1989 AGU.

Table 20. 1989 AGU salaries by major employment sector, PhDs.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
University					
9–10 Month Salary	42.0	44.4	13.0	43	137
11–12 Month Salary	48.0	50.8	20.7	42	151
Industry/Self-Employed	64.0	66.7	21.3	42	108
Government	54.0	54.1	13.3	46	191
FFR&DC	62.0	64.4	11.4	43	47

Table 21. 1989 AGU salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
0–7	37.0	39.1	12.0	35	220
8–15	52.0	53.5	16.0	41	194
16–23	62.5	62.7	13.9	49	181
24 +	70.0	69.8	20.3	58	115

SALARIES AND EMPLOYMENT SECTOR FOR PhDs, AMERICAN GEOPHYSICAL UNION

- Only "regular members" of AGU were sampled in 1989. AGU fellows, lifetime members, and those holding student memberships were excluded from the sampling frame. Because these "non-regular members" were included in the 1987 analysis, the data presented here are not comparable with the salary data published for 1987.

- Salaries paid to AGU members vary by employment sector. The highest paid AGU members work in industry, where the overall median salary in 1989 reached $64,000. National laboratory employees also fared well, reporting a median salary of $62,000. By comparison, academic salaries fall considerably below these levels. This is consistent with the pay structure found among members of the other nine Member Societies.

- As a rule, salaries increase with experience. A new entrant into the labor force, that is, a PhD with less than eight years of experience, can expect to earn anywhere from $32,500 to $50,000 per year, depending on sector of employment. This figure climbs steadily to a high of $70,000, earned by those with 24 or more years of experience.

Table 22. 1989 AGU industrial salary structure by years from degree, PhDs.

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	40.0	50.0	63.0	51.3	14.8	36	37
8–15	59.4	70.0	85.0	75.1	20.5	41	27
16–23	60.0	75.0	87.0	75.4	15.0	49	29
24 +	*	*	*	*	*	*	12

*Number of respondents was too small to calculate reliable statistics.

Table 23. 1989 AGU government salary structure by years from degree, PhDs.

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	37.0	40.0	45.0	41.6	7.8	37	40
8–15	45.2	50.0	58.0	51.6	8.7	42	50
16–23	53.5	60.0	66.6	60.4	9.0	50	59
24 +	63.0	70.0	74.0	66.8	10.2	58	33

• The overall median salary of government employees rose to $54,000 in 1989, placing government somewhere between industry and academe in terms of pay. However, government employees are, on average, three to four years older than their colleagues outside of government. This tends to inflate the overall median government salary. Controlling on years of experience, the government salary structure closely resembles the structure reported by university members who are employed on an 11–12 month salary base.

• While fewer AGU members are employed in national laboratories than in industry or academe, AGU members can be found at 15 different labs nationwide. Members are concentrated at four installations: Jet Propulsion Laboratory, Los Alamos National Laboratory, Lawrence Livermore National Laboratory and Sandia National Laboratory.

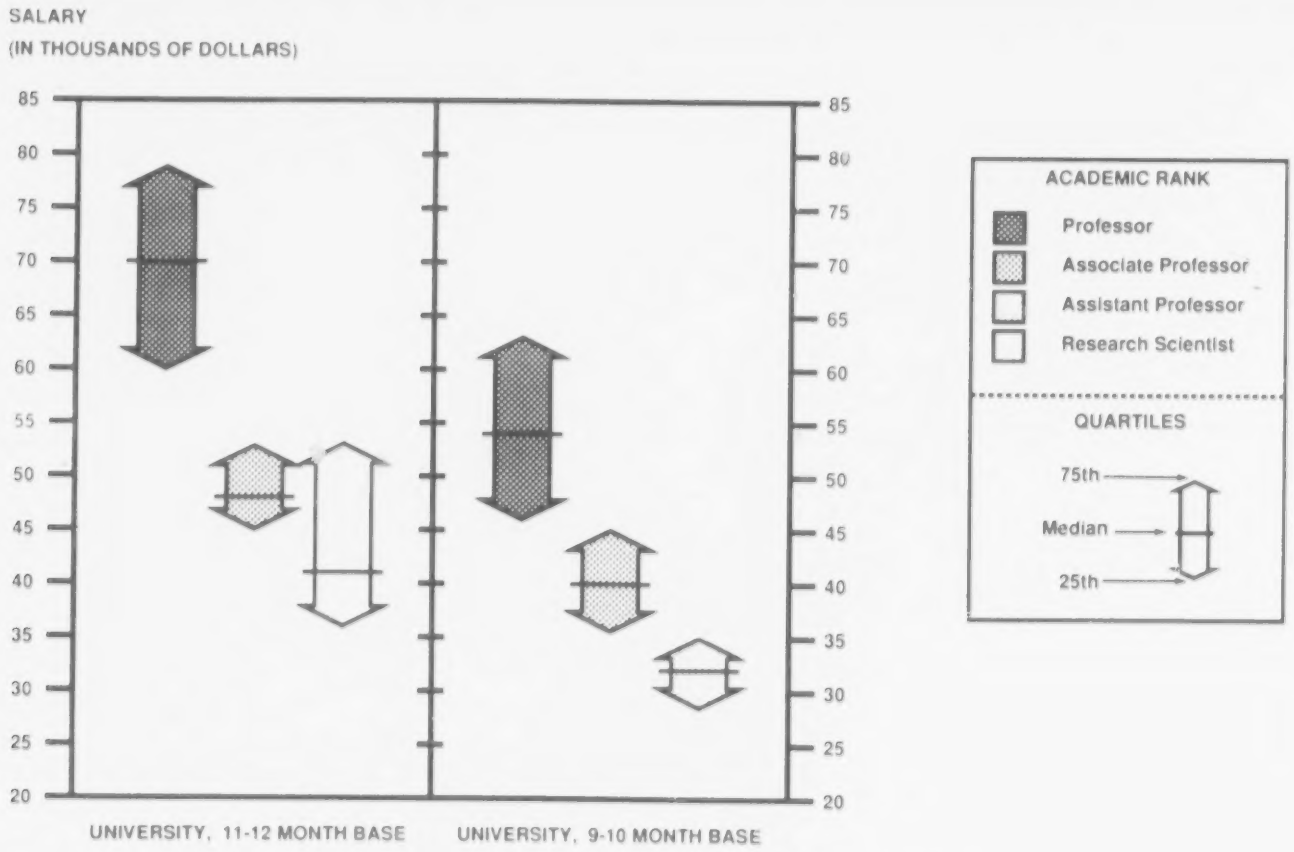

Figure 15. University salaries for PhDs by academic rank, 1989 AGU.

- Universities are the largest employers of AGU members. In 1989, typical university salaries ranged from $42,000 for those on a 9–10 month salary base to $48,000 for those on an 11–12 month base.

- At every level of experience, university salaries fall well below the salaries paid to individuals employed in industry. The industrially employed earned 17–47% more than their colleagues working in universities on 11–12 month contracts.

Table 24. 1989 AGU university 11–12 month salary structure by years from degree, PhDs.[1]

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	36.0	40.0	46.0	40.3	7.4	35	36
8–15	41.0	47.6	54.0	48.0	12.0	41	30
16–23	51.0	64.0	74.7	63.4	13.1	49	35
24 +	64.0	75.0	90.0	78.9	20.7	60	23

[1] *In addition, there were 26 postdoctorates in the 0–7 years from degree group with a median salary of $28,000.*

Table 25. 1989 AGU university 9–10 month salary structure by years from degree, PhDs.[1]

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	29.0	32.5	35.2	33.3	6.3	34	40
8–15	35.6	40.0	50.0	41.8	8.1	40	41
16–23	43.0	50.8	61.0	52.4	10.9	48	27
24 +	50.0	54.0	63.0	55.8	13.0	56	27

[1] *Postdocs excluded.*

Table 26. 1989 AGU university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Professor							
9–10 Month Salary	46.0	54.0	63.0	55.5	11.4	51	55
11–12 Month Salary	60.0	70.0	78.8	71.7	13.8	54	41
Associate Professor							
9–10 Month Salary	35.6	40.0	45.0	40.5	7.1	40	42
11–12 Month Salary	45.0	48.0	52.8	49.6	7.6	40	17
Assistant Professor							
9–10 Month Salary	28.5	32.0	35.0	32.6	4.8	34	35
11–12 Month Salary	*	*	*	*	*	*	10
Research Associate (11–12 Month Salary)							
Postdoctorates	24.0	28.0	30.0	26.9	4.2	31	26
Other Research Staff	36.0	41.0	53.0	46.0	13.7	40	53

**Number of respondents was too small to calculate reliable statistics.*

APPENDIX A: GEOGRAPHIC DIVISIONS

NEW ENGLAND
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

MIDDLE ATLANTIC
New Jersey
New York
Pennsylvania

SOUTH ATLANTIC
Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia
Puerto Rico

EAST NORTH CENTRAL
Illinois
Indiana
Michigan
Ohio
Wisconsin

EAST SOUTH CENTRAL
Alabama
Kentucky
Mississippi
Tennessee

WEST NORTH CENTRAL
Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

WEST SOUTH CENTRAL
Arkansas
Louisiana
Oklahoma
Texas

MOUNTAIN
Arizona
Colorado
Idaho
Montana
Nevada
New Mexico
Utah
Wyoming

PACIFIC
Alaska
California
Hawaii
Oregon
Washington

APPENDIX B: TECHNICAL NOTES

Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. Percentiles were not interpolated when the requested quantiles fell a certain fraction into a group of equal values or when fractional weights were used.

Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Students are not included.

Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles.

Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the sub-group being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means and medians can be determined as follows:

Medians:

M_1, *that point below which* p_1^{th} values fall,

M_2, *that point below which* p_2^{th} values fall,

where

$$p_1 = p + Z\left(\frac{p(1-p)}{n}\right)^{1/2}, p_2 = p - Z\left(\frac{p(1-p)}{n}\right)^{1/2},$$

and

$p = 0.5$,

n = sample size,

z = coefficient of confidence, 1.96 at the 95% confidence level.

Means:

$\bar{x} \pm Zs/(n)^{1/2}$, *where*

$\bar{x}$ = the arithmetic mean,

s = standard deviation,

n = sample size, and

Z = coefficient of confidence 1.96 at the 95% confidence level.

Proportions:

$$p \pm Z\left(\frac{p(1-p)}{n}\right)^{1/2}$$

p = sample proportion observed.

n = sample size, and

Z = coefficient of confidence, 1.96 at the 95% confidence level.

Cost of Living Index

The cost of living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of inter-city cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the all-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.

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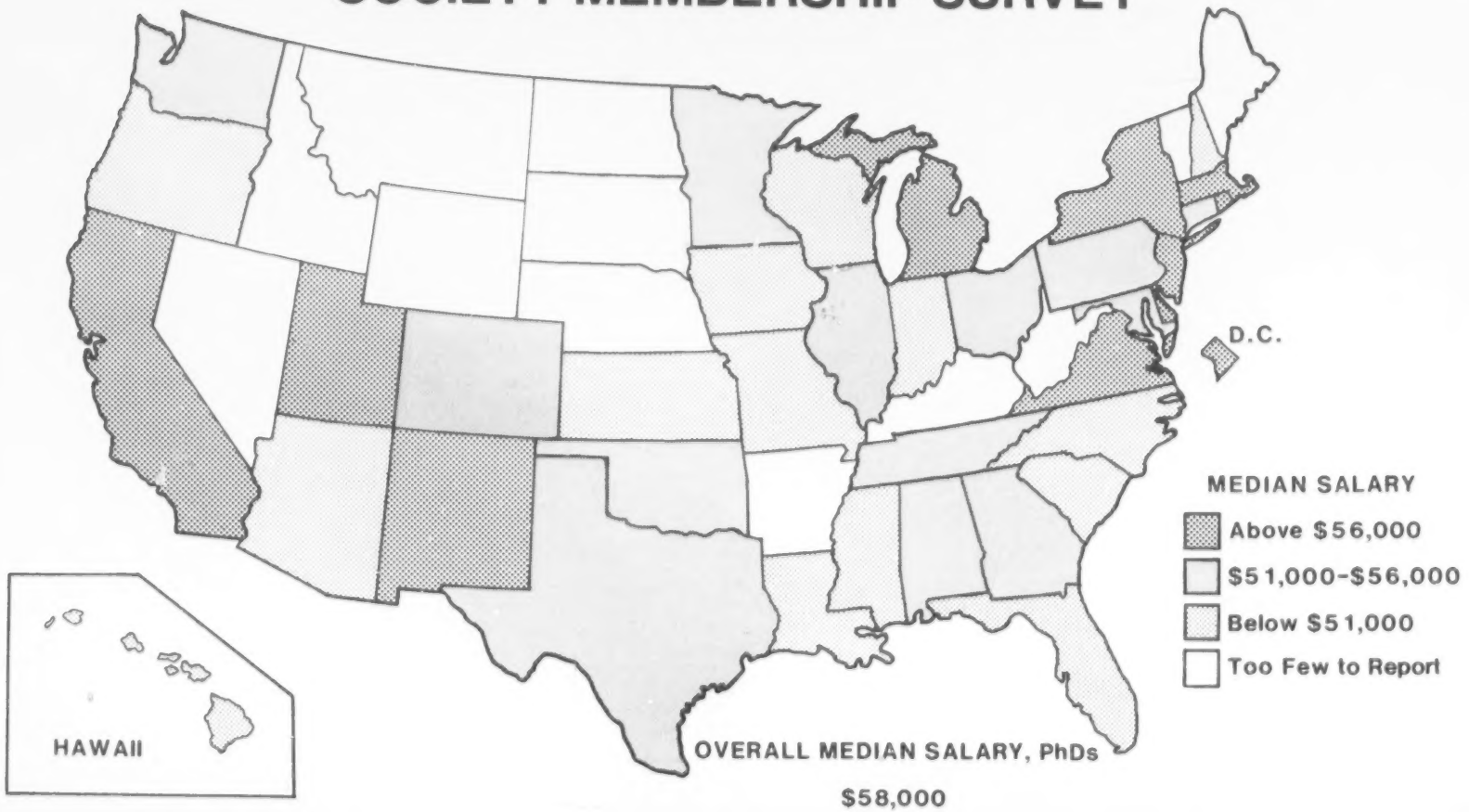
AIP REPORT

EDUCATION & EMPLOYMENT
STATISTICS DIVISION
Tel. 212-661-9404

1990 SALARIES: SOCIETY MEMBERSHIP SURVEY



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1990 SALARIES:

SOCIETY MEMBERSHIP SURVEY

Dawn Kellman and Catherine Scholz

The American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society
American Geophysical Union

COVER (1)

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

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INTRODUCTION

"1990 Salaries: Society Membership Survey" is the seventh in a series of salary reports produced by the Education and Employment Statistics Division of AIP. Initiated in 1982, the series provides nationwide data on the salaries of members of AIP's Member Societies. The 1990 report marks the first time that data based on all ten Member Societies, including the American Geophysical Union, are presented in aggregate. Some highlights of the report include:

- The median annual salary for society members overall reached $54,000 in 1990.
- Among PhDs, salaries continue to keep pace with inflation. The median salary reported by PhDs rose from $55,000 in 1989 to $58,000 in 1990. This represents a 5.5% annual increase, matching the 5.3% inflation rate as measured by the Consumer Price Index.
- Typical starting salaries among recent doctorate recipients range from $35,500 to $50,600 per year, depending on employment sector.
- Across all degree levels, the industrially-employed continue to command the highest wages.
- Over one-third of all PhDs supplement their principal salary with professional income from additional sources. This includes income derived from consulting, summer research, teaching, and, to a lesser extent, patents, royalties, and honoraria.
- PhDs in the Pacific states report the highest overall median salary, $61,300. Those in the West North Central report the lowest, $48,000.
- The proportion of women in the ten AIP Member Societies has increased during the 1980s. Among society members, women now represent 7% of all PhDs, 14% of all masters, and 17% of all bachelors. The entrance of the American Geophysical Union in 1987 accounts for some, but not all, of this increase.
- Female society members earn lower overall salaries than males. Gender differences in age, degree distribution, and academic rank do not entirely account for this wage gap.

Methodology

The figures presented here are based on a stratified random sample of one-sixth of the U.S. membership of the AIP Member Societies. The three smallest societies, the American Association of Physicists in Medicine, the American Crystallographic Association, and the Society of Rheology, were sampled at a higher rate so that each of the ten Member Societies would be well represented. Individuals eligible for inclusion in the 1990 sample had memberships that were current as of December 1989.

In the spring of 1990, all sample members were mailed a brief, two-page questionnaire. The form contained various demographic and employment-related questions regarding subjects such as work activity, level of highest degree, salary and employer. A postage-paid return envelope was also provided. Several weeks after the initial mailing, a second wave of questionnaires was mailed to those who had not yet returned a completed form. Of the 14,899 members who were mailed a questionnaire, 106 forms were returned as undeliverable and 90 members either were deceased, had moved abroad, or refused to participate. Roughly 9,780 completed forms were received, resulting in a 67% response rate.

Structure of the Report

The report opens with a discussion of variations in PhD salaries by geographic location. Data are presented for broad regions of the country, as well as for several states and individual cities. Compensation rates and salary structures in all major sectors of the economy that employ PhD-level members are then described. The sectors include industry, government, national laboratories, and universities. Given that a large percentage of society members are academics, special attention is paid to how salaries vary throughout an academic career. In later sections, compensation patterns among master's and bachelor's degree holders are discussed, focusing primarily on variations by years of experience and employment sector. The final two sections of the report describe differences in PhD salaries by primary work activity and sex. Readers seeking more in-depth information are encouraged to contact the authors.

Caveats

In 1986, the American Geophysical Union (AGU) became the tenth AIP Member Society. Separate analyses of AGU members' salaries were first presented in the 1987 salary report, then again in 1989. Because the current report presents salaries for all ten Member Societies in aggregate for the first time, the data that are presented here cannot be directly compared with earlier published figures.

One final note: salary tables discussing lower-degree holders must be interpreted with caution. Lower-degree holders are poorly represented in the society membership and those who are members tend to be atypical, with special interests in specific society programs.

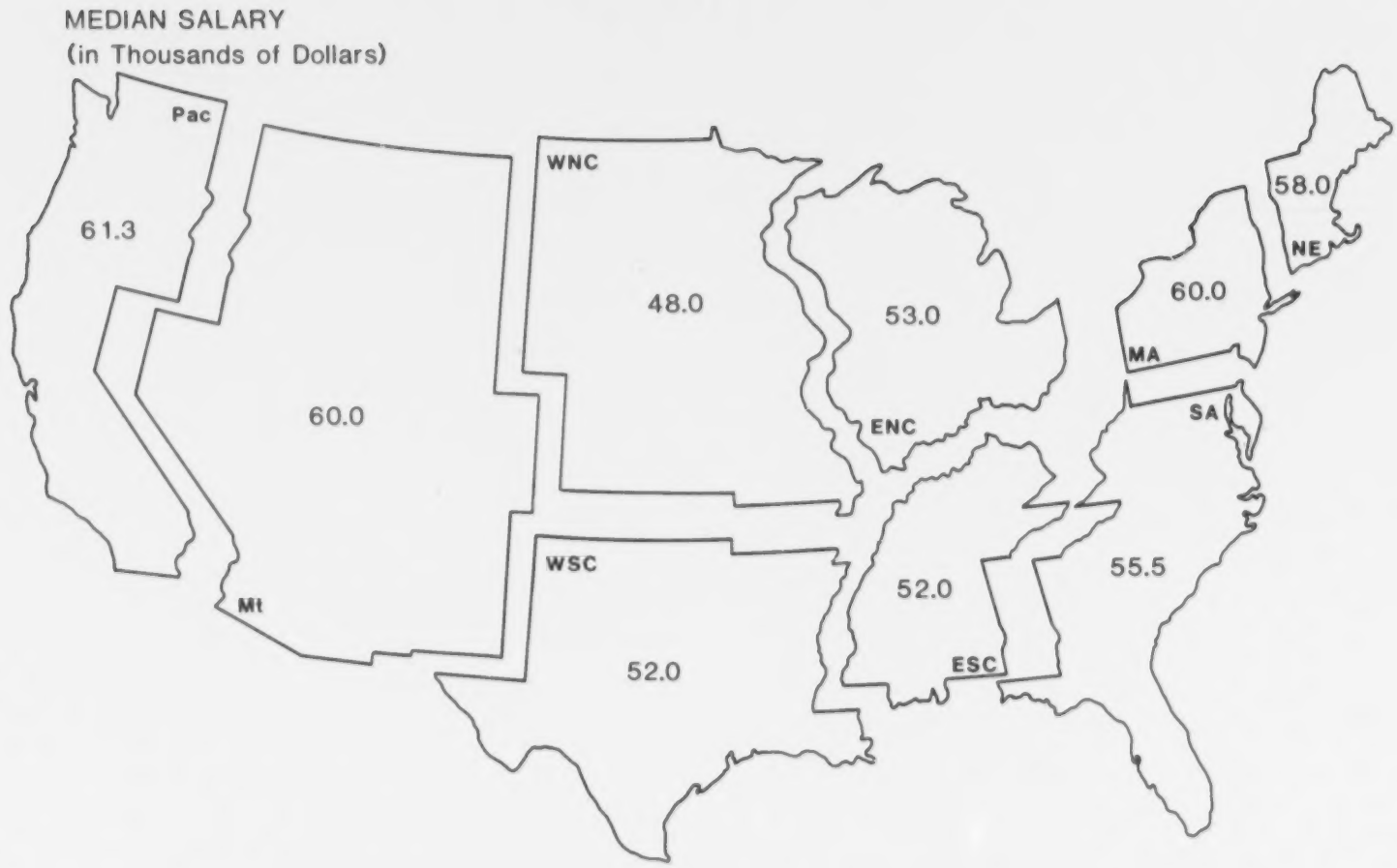

Figure 1. Variation in median salary for PhDs by geographic division, 1990.

Table 1. 1990 salaries by geographic division, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
New England	58.0	61.3	43.1	44	453
Middle Atlantic	60.0	62.8	28.1	45	828
South Atlantic	55.5	58.2	20.8	46	914
East North Central	53.0	55.6	20.8	46	593
East South Central	52.0	52.7	19.1	47	150
West North Central	48.0	51.4	19.5	46	200
West South Central	52.0	55.2	22.1	43	285
Mountain	60.0	59.5	19.6	45	488
Pacific	61.3	65.2	26.4	44	1112

[a] *See Appendix A for state composition of each division.*

SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

• Median salaries for society members holding doctorates vary substantially with geographic location, ranging from $48,000 in the West North Central states to $61,300 in the Pacific. Such differences are due primarily to the salary structures of the individual employment sectors, combined with the employer and age composition of each division. The distribution of states in each division can be found in Appendix A.

• In all geographic divisions of the country, society members employed in industry and other nonacademic sectors receive higher median salaries than those who work in academe. Typically, the highest levels of compensation are observed in industry, although in some states, median salaries in other nonacademic sectors are also quite high due to the influence of large, well-paying national laboratories.

• Although they are among the youngest society members overall, those employed in the Pacific division earn the highest median salary nationwide, $61,300. This figure can be attributed primarily to the high degree of nonacademic private sector employment in California, where nearly 90% of the Pacific division's society members reside. Here, industry accounts for 40% of all employment. In the other Pacific states, academic employment is more prevalent and median salaries are somewhat lower.

Table 2. 1990 salaries by selected employment sector and geographic division, PhDs.

	Academe			Industry			Other		
	Median Salary	Median Age	%	Median Salary	Median Age	%	Median Salary	Median Age	%
New England	49.0	43	52	70.0	44	27	61.3	44	21
Middle Atlantic	53.0	48	49	67.3	41	37	60.0	47	14
South Atlantic	47.0	47	38	65.0	46	20	60.0	47	42
East North Central	50.0	47	65	62.0	44	18	55.0	44	17
East South Central	42.0	47	61	*	*	6	58.7	48	33
West North Central	43.3	48	69	60.0	38	22	*	*	9
West South Central	44.0	44	56	62.0	41	32	55.4	47	12
Mountain	44.3	46	32	63.0	47	14	65.0	45	54
Pacific	50.0	43	37	70.0	44	37	61.0	43	26
Overall	48.2	46	46	66.1	44	27	60.6	45	27

**Number of respondents was too small to calculate reliable medians.*

• The median salary in the Mountain states, $60,000, is second only to that in the Pacific division. This high overall figure can be attributed primarily to the large, well-paying national laboratories in New Mexico, Arizona, and Colorado, such as Sandia and Los Alamos. Over 40% of society members residing in the Mountain states are employed at national laboratories, where they report earning a median salary above that of even their industrial counterparts. In New Mexico, over three-quarters of society members are employed at national labs.

• Nearly 40% of society members residing in the Middle Atlantic division are employed in industry. This heavy concentration of industrial employment, combined with fairly high industrial salaries, is largely responsible for the overall median salary of $60,000 observed in the division. The median age of industrially-employed individuals in these states, furthermore, is three years below the national median, making their salaries, when controlled for age, the highest industrial salaries in the country. Academic salaries in the Middle Atlantic are also high relative to the rest of the U.S.

• Relatively low median salaries, $52,000 or less, are reported in the East South Central, West South Central, and West North Central divisions. A very high proportion of society members in these states is employed in academe, mostly at state universities or small private colleges. Some of the lowest-paid industrial employees in the country also reside in these three divisions. However, the relatively inexpensive cost of living in these states brings their salaries more in line with rates of compensation in other parts of the country.

Table 3. 1990 salaries and employment sector distribution for selected states, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	Academe %	Industry %	Gov't %	FFR&DC %	Other %
Alabama	55.0	57.3	23.1	47	34	72	13	13	–	2
Arizona	50.3	54.5	22.0	43	60	61	11	6	15	7
California	65.0	67.3	27.2	44	941	32	40	6	18	4
Northern	65.0	67.8	26.6	44	484	25	37	9	24	5
Southern	63.0	66.8	27.8	43	457	40	42	3	12	3
Colorado	51.1	54.9	19.2	44	135	35	26	28	9	2
Connecticut	55.0	65.3	93.5	45	73	60	28	4	–	8
Delaware	61.0	67.3	25.6	45	26	21	71	–	4	4
DC	63.0	61.5	17.2	48	156	10	2	80	1	7
Florida	47.8	51.0	18.8	46	106	64	15	14	–	7
Georgia	54.0	56.9	23.4	46	55	65	17	4	–	14
Hawaii	45.0	50.9	19.0	40	22	71	4	7	–	18
Illinois	51.7	55.1	21.1	45	198	53	14	2	25	6
Indiana	46.0	51.9	22.0	45	76	90	6	3	–	1
Iowa	47.0	51.6	19.7	45	41	82	4	–	12	2
Kansas	42.0	50.9	23.5	51	22	80	13	–	5	2
Louisiana	50.0	51.5	20.7	46	28	82	15	–	–	3
Maryland	55.0	57.6	18.1	45	262	26	21	42	4	7
Massachusetts	60.4	63.1	23.5	44	299	44	29	11	7	9
Michigan	57.0	58.7	20.4	44	109	65	25	4	–	6
Minnesota	52.0	54.0	19.4	44	70	58	36	–	–	6
Mississippi	40.5	44.9	14.2	43	22	56	–	44	–	–
Missouri	50.0	51.1	16.5	46	46	66	26	–	–	8
New Hampshire	48.2	48.5	16.9	41	33	72	21	6	–	1
New Jersey	66.0	68.4	20.5	44	217	27	61	2	7	3
New Mexico	65.0	66.2	18.2	46	219	10	7	4	77	2
New York	59.8	62.8	33.4	46	423	51	31	2	9	7
Northern	56.1	58.4	19.2	45	207	59	35	1	2	3
Southern	62.9	67.0	42.4	47	216	43	27	2	17	11
North Carolina	49.3	52.2	18.8	47	75	75	18	3	–	4
Ohio	55.0	58.0	20.1	48	138	61	24	11	–	4
Oklahoma	52.7	55.4	24.0	47	31	45	38	15	–	2
Oregon	43.0	48.2	17.6	45	42	81	17	–	–	2
Pennsylvania	52.5	56.2	19.9	47	187	71	22	2	–	5
Rhode Island	59.0	57.3	25.8	44	21	82	14	4	–	–
South Carolina	40.0	48.8	19.9	43	25	78	16	–	4	2
Tennessee	56.0	54.6	18.1	47	74	48	5	–	45	2
Texas	54.0	55.9	22.1	43	216	53	35	5	–	7
Utah	59.0	54.5	17.9	50	32	87	10	3	–	–
Virginia	60.0	63.7	24.5	47	200	36	32	24	5	3
Washington	53.0	55.0	16.9	44	92	48	31	6	12	3
Wisconsin	46.6	51.2	19.4	44	72	80	17	2	–	1

[a] *Several states were not included above because the number of respondents was too small to calculate reliable statistics.*

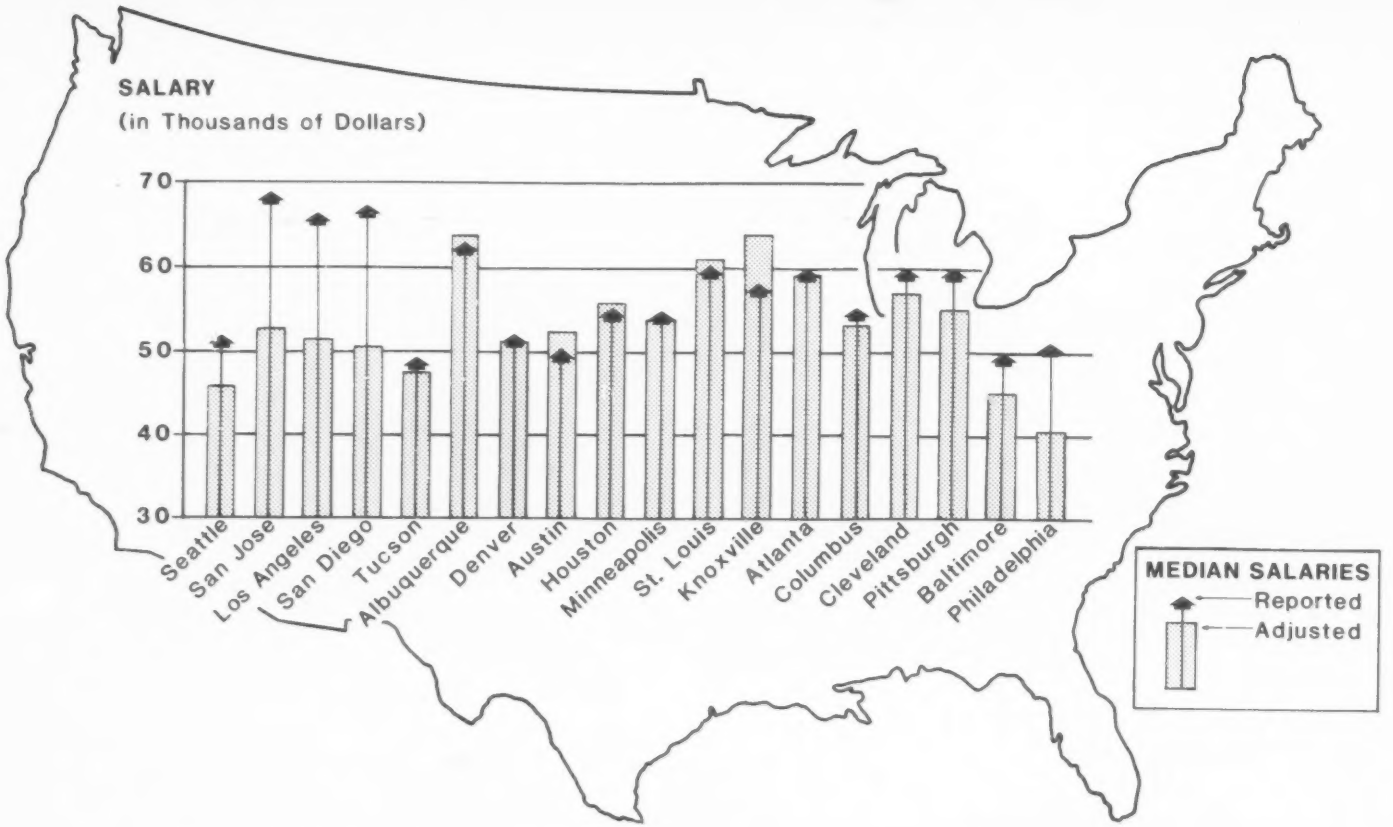

Figure 2. Median salaries for PhDs in selected metropolitan areas, 1990. Both reported salaries and salaries adjusted for cost of living are presented.

• The cities listed in Table 4 all volunteered to participate in a survey conducted by the American Chamber of Commerce Researchers Association (ACCRA) during the first quarter of 1990. Each of these cities has a substantial number of society members in residence, permitting calculation of reliable medians. Several large metropolitan areas, including New York, Boston, San Francisco, and Washington, D.C., did not respond to the ACCRA survey and are consequently absent from the table.

• In an attempt to "provide a useful and reasonably accurate measure of living cost differences among urban areas," each respondent to the ACCRA survey is assigned a cost-of-living index based upon relative price levels for a standardized basket of goods and services. The national average for the index is 100; areas with indices above this figure have a relatively high cost of living, while those with indices below have a relatively low one. The adjusted salaries in Table 4 reflect relative rates of compensation after the cost of living is taken into account and cannot be considered representative of absolute buying power.

• In San Jose, Los Angeles, San Diego, and Philadelphia, the cost of living, especially housing and health care, is so high that society members'

Table 4. 1990 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.[a]

	Cost of Living Index	Median Salary	Adjusted Salary	Median Age	Academic %	Non-Academic %	Total Number Known
Albuquerque	99.1	62.8	63.4	44	14	86	82
Atlanta	101.8	60.0	58.9	44	61	39	38
Austin	95.4	50.0	52.4	43	85	15	40
Baltimore	111.4	50.0	44.9	44	43	57	67
Cleveland	106.2	60.0	56.5	46	44	56	31
Columbus	104.0	55.0	52.9	49	76	24	35
Denver	101.3	52.0	51.3	46	23	77	48
Houston	99.5	55.4	55.7	42	35	65	70
Knoxville	90.9	57.7	63.5	49	21	79	44
Los Angeles	127.4	66.0	51.8	44	40	60	129
Minneapolis	102.9	55.0	53.4	44	62	38	41
Philadelphia	127.5	51.5	40.4	43	66	34	68
Pittsburgh	109.5	60.0	54.8	48	61	39	33
St. Louis	98.2	60.0	61.1	44	45	55	24
San Diego	132.8	67.0	50.5	43	36	64	109
San Jose	129.3	68.0	52.6	43	25	75	78
Seattle	113.2	52.0	45.9	45	66	34	55
Tucson	102.9	49.0	47.6	41	64	36	42

[a] *Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0.*

$$\text{Adjusted salary} = \frac{\text{Median Salary}}{\text{cost of living \%}}$$

adjusted salaries fall more than 20% below their reported salaries. The impact of such high living expenses is mitigated somewhat in the three California cities by high unadjusted median salaries of more than $65,000, primarily from industrial employers. Even after the cost of living is taken into account, members in these cities receive adjusted salaries which exceed $50,000. In Philadelphia, however, two-thirds of society members are employed in academe and an already low unadjusted salary of $51,500 drops to $40,400 when the high cost of living in the city is considered.

• The adjusted median salary in Baltimore is $44,900, the second lowest among the metropolitan areas listed in Table 4. As in Philadelphia, this figure is due to a combination of high living costs and a low unadjusted median salary of $50,000. Approximately 45% of society members in the area are employed in academe, and an additional 15% are working in government, where salaries are also typically below the national median.

• Among the urban areas listed in Table 4, Albuquerque and Knoxville have the highest median salaries after adjustments are made for local cost of living. Over three-fourths of society members in these cities are employed in high-paying nonacademic jobs, primarily at Sandia and Oak Ridge National Laboratories. This heavy concentration of nonacademic employment, combined with a fairly low cost of living, is reflected in adjusted salaries which are exceptionally high.

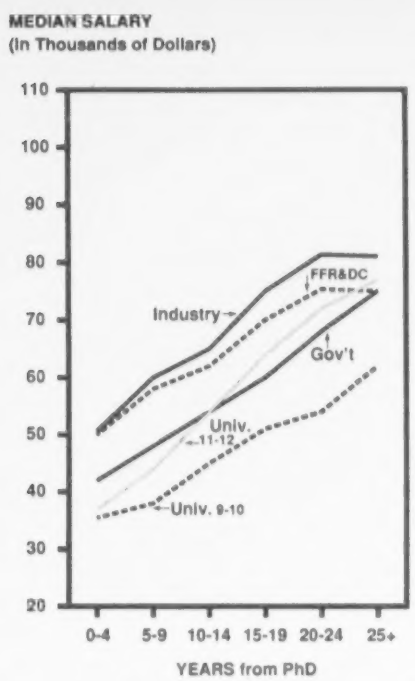

Figure 3. Median salaries by type of employer and years from PhD, 1990.

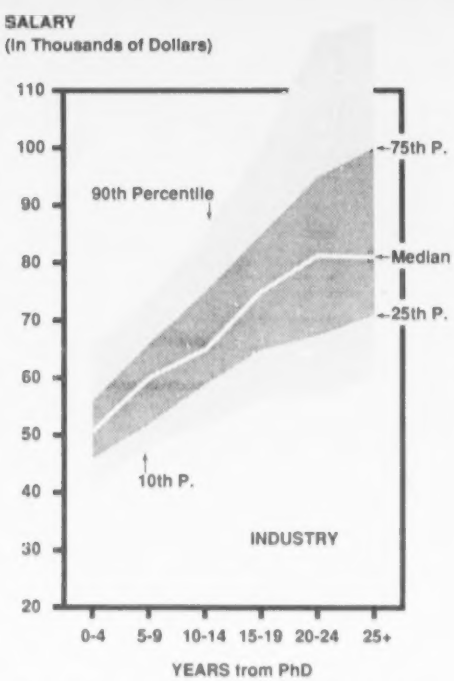

Figure 4. Salary structure in industry by years from PhD, 1990.

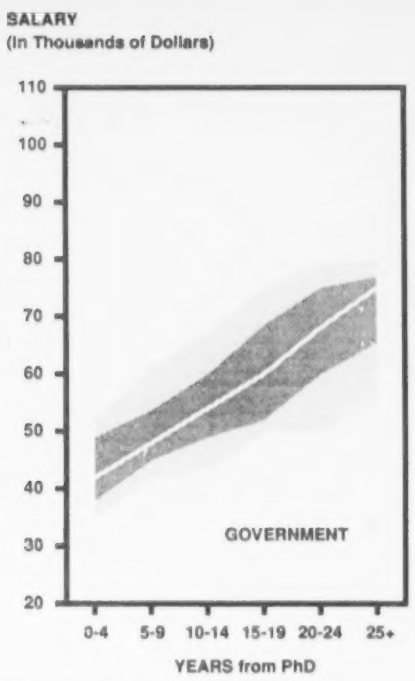

Figure 5. Salary structure in government by years from PhD, 1990.

SALARIES AND EMPLOYMENT SECTOR FOR PhDS

- PhDs report earning a median annual salary of $58,000 in 1990. However, rates of compensation vary considerably from one employment sector to the next. Typical salaries range from a low of $40,000 in four-year colleges up to $66,100 in industry.
- Between March 1989 and March 1990, the inflation rate, as measured by the Consumer Price Index, was 5.3%. On the whole, PhD salaries managed to keep pace with inflation, rising 5.5% during the same twelve-month period. However, this varied from sector to sector. Only university and industrial salaries experienced increases near the inflation rate. Salaries in government, national laboratories and nonprofit organizations lost ground to inflation.
- A new entrant into the labor market earns, on average, anywhere from $35,500 to $50,600, depending on employment sector. Salaries then increase steadily with experience, and differences between the various sectors become even more pronounced.
- As in all employment sectors, industrial salaries are clustered in a fairly narrow range during the early career years. After fifteen years of experience, though, the spread of typical salaries in industry becomes very wide. This is due to a number of high-wage earners, primarily administrators, who pull the top end of the salary distribution up past the $100,000 a year mark.
- In government, unlike industry, significant discrepancies do not exist between the highest and lowest salaries. This is a reflection of the structure of the civil service grades and of federal salary ceilings. In addition to falling into a narrow range, government salaries are also the lowest among all nonacademic employers. At most levels of experience, salary increases of 20–25% would be necessary to make government competitive with the private sector.

Table 5. 1990 salaries by major employment sector, PhDs.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
University					
9–10 Month Salary	50.0	53.3	17.2	48	1176
11–12 Month Salary	49.2	53.9	25.8	41	848
4-Year Colleges					
9–10 Month Salary	40.0	41.4	10.0	49	170
Industry/Self-Employed	66.1	71.9	35.0	44	1333
Government	57.0	57.7	14.4	47	533
FFR&DC	64.5	64.8	17.2	44	565
Nonprofit	60.0	61.2	24.9	45	155
Hospital	63.0	65.5	32.8	44	76

Table 6. 1990 salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	43.8	44.7	12.3	33	501
5–9	50.8	51.4	14.2	36	791
10–14	57.0	58.1	16.9	41	758
15–19	65.0	65.8	21.4	46	811
20–24	67.0	69.5	35.5	50	770
25–29	70.0	70.0	22.3	55	522
30 +	72.0	76.3	33.9	62	527

[a] *Postdoctorates excluded.*

Table 7. 1990 industrial salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	41.0	46.0	50.6	56.0	65.7	52.1	11.3	33	173
5–9	48.0	52.0	60.0	66.0	74.0	60.0	13.7	37	264
10–14	51.8	59.0	65.0	75.0	85.2	67.9	15.8	41	251
15–19	56.1	65.0	75.0	85.0	100.0	77.9	25.3	46	254
20–24	57.0	67.5	81.3	95.0	120.0	86.6	60.4	50	185
25 +	60.0	71.0	81.0	100.0	122.0	93.1	47.5	59	182

[a] *In addition, there were 17 postdoctorates in the 0–4 years from degree group with a median salary of $46,000.*

Table 8. 1990 government salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	35.0	38.0	42.0	49.0	52.0	43.7	8.7	33	43
5–9	41.8	45.0	48.0	53.7	61.0	49.6	9.1	38	78
10–14	43.0	49.0	54.0	60.0	67.0	54.0	9.2	42	84
15–19	50.0	52.0	60.0	68.5	75.0	60.8	9.8	47	101
20–24	50.0	60.0	68.0	75.0	79.0	66.5	11.0	51	97
25 +	55.0	65.4	75.0	77.0	80.0	70.8	10.8	59	94

[a] *In addition, there were 28 postdoctorates in the 0–4 years from degree group with a median salary of $31,200.*

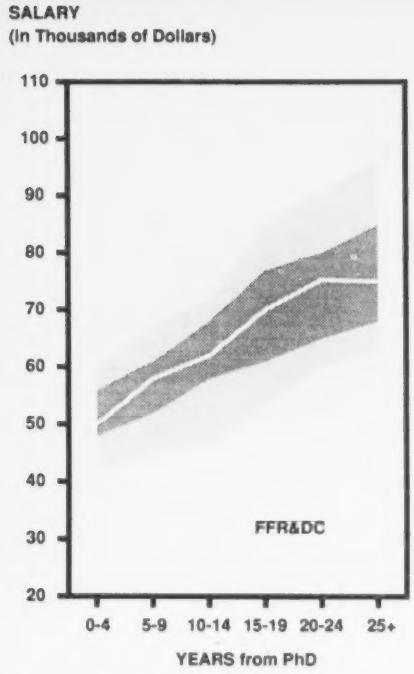

Figure 6. Salary structure in the national laboratories by years from PhD, 1990.

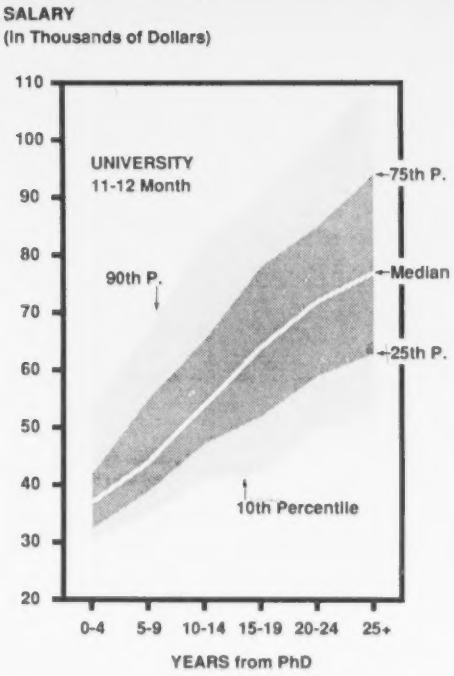

Figure 7. Salary structure in universities for 11–12 month salary base, by years from PhD, 1990.

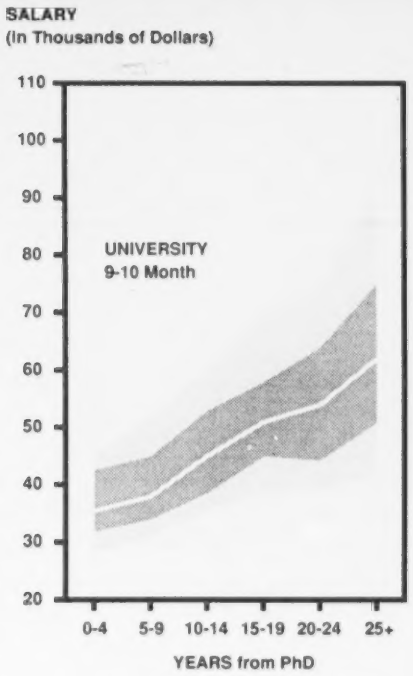

Figure 8. Salary structure in universities for 9–10 month salary base, by years from PhD, 1990.

• PhDs employed at the national laboratories are among the youngest and best-paid of all society members. The average salary paid to members at national labs, $64,500, is second only to that in industry. Half of all society members with doctorates who work at a national laboratory are employed at one of three installations: Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratory.

• Salary ranges for members working on a 9–10 month salary base in universities are relatively narrow at each level of experience. These individuals are almost exclusively full, associate, and assistant professors who are engaged primarily in teaching and secondarily in basic research. Many supplement their salary with income derived from summer research, consulting, and summer course loads; roughly 80% of all PhDs on 9–10 month contracts report earning some form of additional professional income, which amounts to 18%, on average, of their total income.

• University employees on 11–12 month contracts receive salaries which are clustered within a narrow range during the first several years from degree. Later, the span of typical salaries broadens considerably, such that the scattering of salaries becomes as great as that observed in industry. This is a reflection of the diverse career paths observed in academe–paths ranging from professorships to administrative and research staff positions.

Table 9. 1990 FFR&DC salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES (in thousands of dollars) 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	42.0	48.0	50.0	56.0	60.0	52.5	10.5	32	43
5–9	45.0	52.0	58.0	61.0	67.0	56.9	7.8	35	92
10–14	46.4	58.0	62.0	68.0	72.0	61.6	9.9	41	91
15–19	53.4	61.0	70.0	77.1	85.0	70.4	12.8	46	104
20–24	60.0	65.0	75.3	80.0	91.0	75.8	13.7	50	92
25 +	62.9	68.0	75.0	85.0	96.0	78.5	15.9	59	96

[a] *In addition, there were 36 postdoctorates in the 0–4 years from degree group with a median salary of $32,000.*

Table 10. 1990 university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES (in thousands of dollars) 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	30.0	32.4	37.0	42.0	54.0	39.0	9.7	33	78
5–9	35.0	39.0	44.0	55.0	66.8	48.7	14.2	36	108
10–14	41.1	47.3	54.0	65.3	83.0	58.1	16.1	41	89
15–19	42.0	52.0	64.0	78.0	90.0	65.2	19.9	46	93
20–24	50.0	59.0	72.0	85.0	100.0	73.9	21.3	50	106
25 +	52.0	63.0	77.0	94.0	110.0	80.3	26.4	59	141

[a] *In addition, there were 172 postdoctorates in the 0–4 years from degree group with known salaries working in universities on an 11–12 month salary base. Their median salary was $27,000.*

Table 11. 1990 university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES (in thousands of dollars) 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	28.0	31.9	35.5	42.6	45.3	36.8	7.1	33	98
5–9	31.0	34.0	38.0	45.0	52.0	40.3	8.4	36	164
10–14	35.5	38.6	45.0	53.0	60.0	46.3	10.4	40	156
15–19	38.8	45.0	51.0	58.0	70.0	52.7	13.0	45	143
20–24	39.0	44.3	54.0	64.0	75.0	55.7	14.4	50	194
25 +	41.6	50.8	62.0	75.0	91.0	64.2	18.0	58	418

[a] *Number of postdoctorates was too small to calculate reliable medians.*

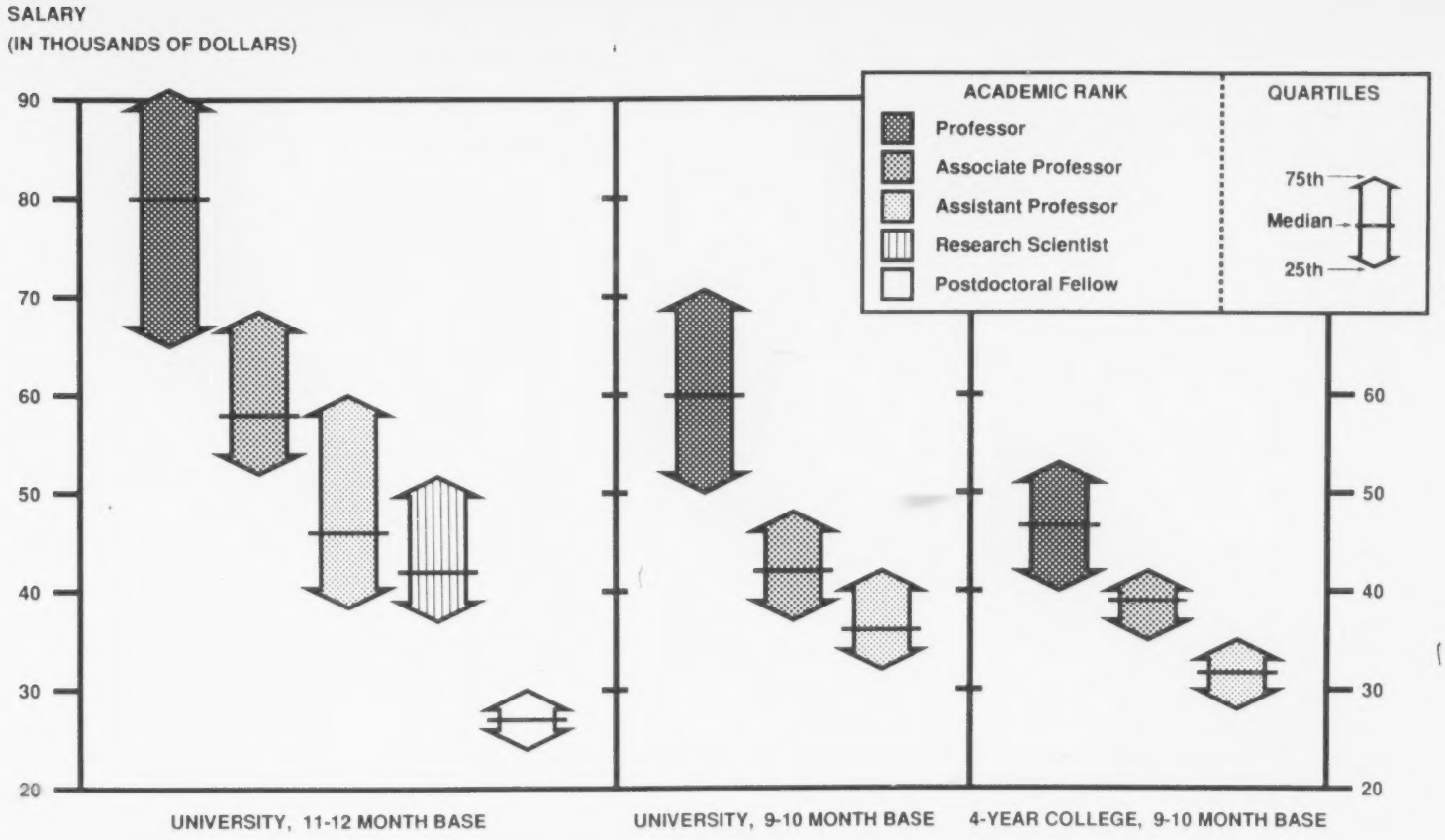

Figure 9. University and 4-year college salaries for PhDs by academic rank, 1990.

Salaries and Academic Rank

• The university is the single largest employer of society members; roughly 40% of all members with doctorates work in a university. As a group, the academically-employed tend to be older and less well paid than their nonacademic colleagues.

• Academic salaries vary by rank, discipline, and type of institution. Based on responses from more than 2,100 colleges and universities, the American Association of University Professors (AAUP) reports that faculty members at private, independent institutions earn the highest salaries, followed by faculty at public institutions. Private, church-related institutions pay the least. Similarly, salaries reflect the types of degrees an institution awards. Doctoral-granting facilities are the best paying, followed by comprehensive, baccalaureate, and two-year institutions.

• The aging of the university professoriate continues to be a major concern for the physics community. Six out of ten society members who hold

Table 12. 1990 university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES (in thousands of dollars)			Mean Salary	Standard Deviation	Median Age	Total Number Known
	25th	Median	75th				
Professor							
9–10 Month Salary	50.0	59.5	70.6	61.9	16.2	53	709
11–12 Month Salary	65.0	80.0	91.0	79.9	21.2	53	237
Associate Professor							
9–10 Month Salary	37.0	42.0	48.0	43.1	7.7	41	262
11–12 Month Salary	52.0	58.0	68.5	61.2	14.8	44	84
Assistant Professor							
9–10 Month Salary	32.0	36.0	42.0	36.9	6.8	34	194
11–12 Month Salary	38.4	46.0	60.0	49.7	15.3	36	70
Research Associate (11–12 Month Salary)							
Postdoctorates	24.0	27.0	30.0	27.0	4.2	32	194
Other Research Staff	37.0	42.0	51.7	46.0	12.7	39	174

Table 13. 1990 4-year college salaries by selected academic rank on 9–10 month salary base, PhDs.

	QUARTILE SALARIES (in thousands of dollars)			Mean Salary	Standard Deviation	Median Age	Total Number Known
	25th	Median	75th				
Professor	40.0	46.6	53.0	47.1	9.2	53	88
Associate Professor	35.0	39.0	42.0	39.8	6.4	44	36
Assistant Professor	28.0	31.7	35.0	31.8	4.6	37	45

a professorial rank in a university are full professors. This top heavy structure could prove problematic as we enter the 1990s and many current physics faculty members reach retirement age.

• At each academic rank, professors on 11–12 month contracts earn more than those on 9–10 month contracts. This is the result of three factors: 1) faculty on 11–12 month contracts report salaries which cover the entire year, including the summer months; 2) at each professorial rank, those on 11–12 month contracts are older; and 3) professors who are primarily involved in administration, and therefore command higher salaries, are more likely to be on 11–12 month contracts. After these three factors are controlled for, the salaries paid to professors on both bases appear to be remarkably similar.

• According to data published by the AAUP, physics professoriate salaries are in line with salaries paid to faculty in the other physical sciences and mathematics. Top academic salaries go to engineering, business and computer science faculty. In fact, among new assistant professors in these select disciplines, salaries exceed the overall average by one-third as a result of stiff competition with the private sector.

• Less than 5% all of society members with doctorates work in four-year colleges. At age 49, they are older as a group than society members employed in every other major sector. Despite being older, associate and assistant professors employed in four-year colleges earn considerably less than their university counterparts. Similarly, although full professors in four-year colleges are the same age as full professors in universities, they earn 28% less per year.

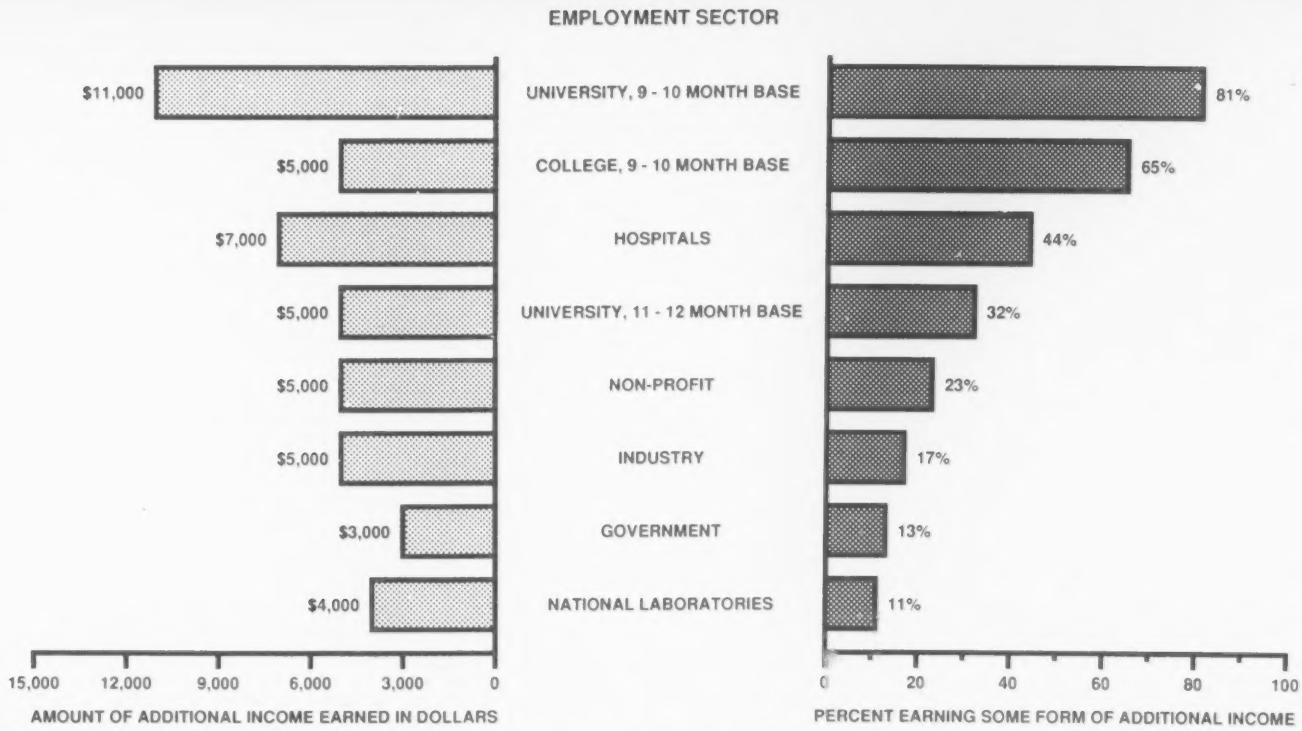

Figure 10. Median additional income, and percent earning some form of additional income, by type of employer, 1990.

Additional Sources of Professional Income

• Over one-third of all full-time employed PhDs supplement their principal salaries with earnings from additional sources. The most frequently cited sources include: consulting, summer research, teaching, and, to a lesser extent, patents, royalties, and honoraria. While the amount of additional income earned varies from a few hundred dollars to tens of thousands, the overall median for PhDs is $8,000. Members employed in academe and hospitals are the most likely to earn additional professional income.

• University-employed PhDs earn, on average, 27% less at each level of experience than PhDs in industry. Additional income from summer teaching, research, and consulting reduces this gap somewhat, but does not eliminate it. After including additional earnings, university salaries still fall short of those received in industry by 18%.

• Among nonacademic members, PhDs employed in hospitals are the most likely to supplement their principal salaries. This auxiliary income comes almost exclusively from consulting; approximately 85% of PhDs employed in hospitals who earn some form of additional income consult. At an average of $7,000 per year, this additional income represents 10% of their total take-home pay and brings the total professional income of hospital-employed PhDs up to par with the total income of the industrially-employed.

• PhDs employed in the national laboratories and government are least likely to earn additional income. Roughly 10% of these members supplement their principal salary with outside earnings, averaging $3,000-4,000 per year.

Table 14. 1990 salaries by selected employment sector, Masters.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
Junior College	38.3	38.8	8.5	50	56
Secondary School Teachers	36.0	37.1	10.2	45	275
Industry/Self-Employed	52.0	58.0	48.4	39	458
Government	46.4	47.3	12.4	43	197
FFR&DC	54.4	57.4	23.7	39	59
Nonprofit	42.3	46.2	15.4	40	26
Hospital	55.0	56.3	16.6	39	73

SALARIES FOR MASTERS AND BACHELORS

• Although the vast majority of society members are PhDs, a small proportion, 25%, hold only master's or bachelor's degrees. These individuals often have very specific society interests and are not typical of all lower degree holders in the physical sciences. Over two-thirds of this group are employed primarily in industry, secondary schools, and government. The remaining one-third are full-time graduate students pursuing advanced training.

• At the master's level, approximately 37% of employed society members work in industry, 22% in secondary schools, and 16% in government. At entry level, salaries of the best-paid high school teachers overlap the lowest industrial salaries. However, typical salaries received in industry are significantly higher than those received in secondary schools. This huge salary differential exists despite the fact that high school teachers, at age 45, are on average six years older than their industrially-employed counterparts.

• Master's degree holders comprise 75% of all society members employed in secondary schools. These individuals are several years older than their nonacademic counterparts at all but the highest level of experience. In contrast, at the bachelor's level, secondary school employees tend to be similar in age or younger than those working in other sectors. This shift in relative ages suggests that many high school teachers who pursue master's degrees do so after they have been in the workforce for a period of time.

• The range of salaries for masters in both government and secondary schools is fairly narrow. At low levels of experience, industrial salaries fall into an equally narrow band. However, typical salaries of industrially-employed individuals several years from their master's degrees span a range of as much as $25,000.

• A small number of master's degree holders are employed in national laboratories and hospitals. The highest median salaries among masters, over $54,000 annually, are reported by these individuals. Furthermore, the difference between median salaries at the master's and doctoral levels in these sectors is proportionately less than in other major employment sectors.

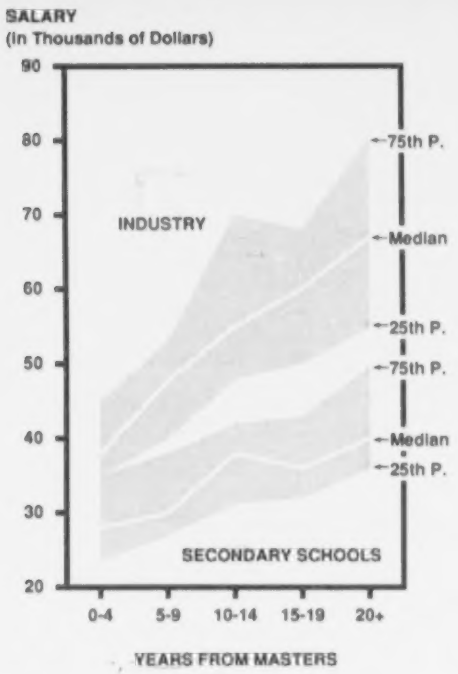

Figure 11. Salary structure in industry and secondary schools by years from master's degree, 1990.

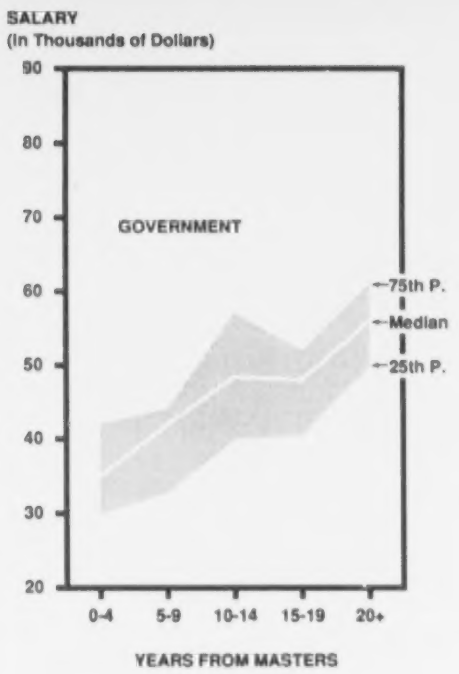

Figure 12. Salary structure in government by years from master's degree, 1990.

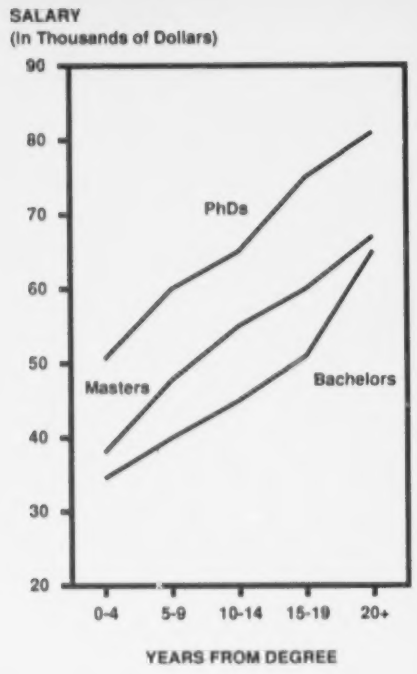

Figure 13. Median salaries in industry by degree level and years from degree, 1990.

● Over one-fourth of masters receive income from bonuses, honoraria, overtime pay, and secondary jobs, in addition to their basic annual salaries. While the additional professional incomes of some individuals are quite high, the median additional income for this group as a whole is only $4,000. Members employed in academe and hospitals are more likely to have a secondary source of income than their counterparts in government, national labs, and industry.

● Nearly 40% of master's-level high school teachers receive professional income in addition to their principal salaries. However, even with this supplemental income of, on average, $2,400 annually, secondary school salaries still fall substantially below those received by masters in industry. Summer teaching is cited by 45% as a source of additional income. Consulting and other activities are also sources.

Table 15. 1990 salaries by selected employment sector and years from degree, Masters.

	Years from Degree	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Secondary School (teachers only)	0–4	23.5	28.0	35.0	29.6	8.2	38	32
	5–9	27.0	30.0	38.0	32.1	8.3	39	34
	10–14	31.2	38.0	42.0	37.5	9.1	42	41
	15–19	32.0	36.0	43.0	37.6	10.1	45	92
	20 +	36.0	40.0	49.6	41.6	9.8	52	76
Industry	0–4	35.0	38.0	45.0	41.0	12.5	30	106
	5–9	40.0	47.8	53.0	49.1	13.2	34	91
	10–14	48.0	55.0	70.0	59.0	18.1	38	85
	15–19	50.0	60.0	68.1	61.1	16.8	42	53
	20 +	55.0	67.0	80.0	77.4	87.5	56	120
Government	0–4	30.0	35.0	42.0	36.8	8.9	33	46
	5–9	32.8	42.0	44.1	41.9	9.9	34	29
	10–14	40.0	48.5	57.1	49.8	11.5	39	38
	15–19	40.6	48.0	52.0	48.3	8.3	44	28
	20 +	50.0	56.0	61.0	56.7	10.4	55	55

Table 16. 1990 industrial salaries by years from degree, Bachelors.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
0–4	34.5	35.9	10.1	26	37
5–9	40.0	41.7	11.2	30	59
10–14	45.0	45.9	11.0	35	37
15–19	51.0	53.2	20.8	40	26
20 +	65.0	71.9	27.8	53	83

• Approximately 60% of society members holding only bachelor's degrees work in the industrial sector, where the median salary is $47,000. Secondary schools and government employ an additional 17% and 14%, respectively. As at the master's level, bachelors employed in secondary schools receive salaries which are substantially below those received in industry and government. In fact, with a median salary of $26,000 per year, these individuals report the lowest wages of all society members.

• Industry is the only sector with enough lower degree holders for comparison of median salaries across degree levels. As a general rule, individuals with more advanced degrees receive higher salaries. At entry level, bachelors in industry earn a median salary of $34,500, masters earn $38,000, and PhDs earn $50,600. At higher levels of experience, the disparity between PhDs' and bachelors' median salaries ranges from $16,000 to $24,000.

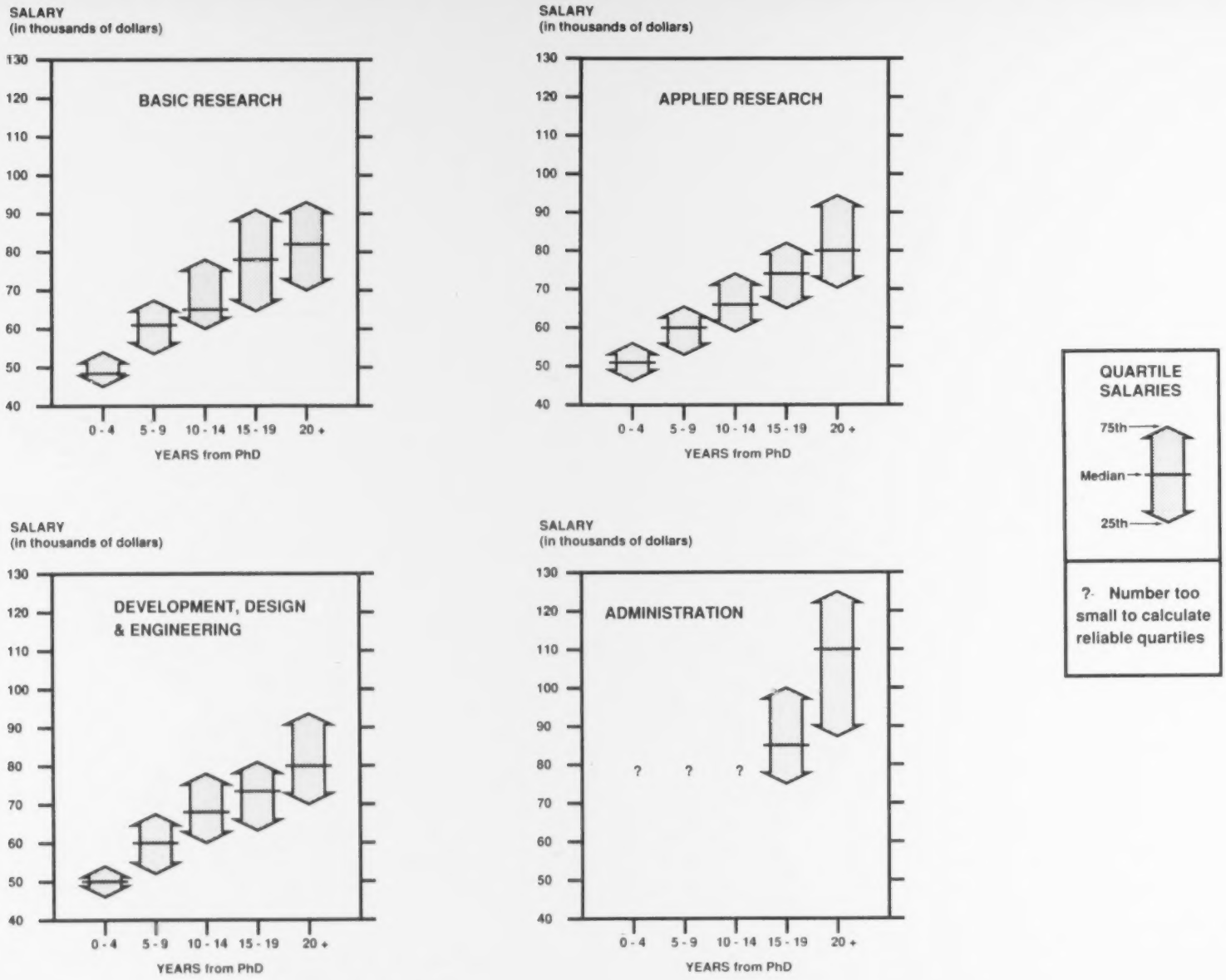

Figure 14. Industrial salaries by principal work activity and years from PhD, 1990.

Table 17. 1990 industrial salaries by primary work activity and years from degree, PhDs.

Years from Degree	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Basic Research							
0–4	45.0	48.4	54.0	49.0	9.0	31	35
5–9	53.5	61.0	67.4	60.7	10.2	35	46
10–14	60.0	65.0	78.0	67.9	12.3	40	27
15–19	64.6	78.0	91.0	78.3	20.0	45	23
20 +	70.0	82.0	93.0	83.9	20.2	56	41
Applied Research							
0–4	46.2	51.0	56.0	52.9	9.6	32	87
5–9	53.0	60.0	65.5	59.7	9.3	36	104
10–14	59.0	66.0	74.0	67.2	13.7	40	97
15–19	65.0	74.0	82.0	75.5	15.2	45	103
20 +	70.3	80.0	94.4	83.2	17.8	54	117
Development, Design, and Engineering							
0–4	46.0	50.0	54.0	50.9	7.8	32	42
5–9	52.0	60.0	67.5	61.3	18.6	37	82
10–14	60.0	68.0	78.0	68.8	13.2	42	73
15–19	63.2	73.4	81.0	74.4	18.3	47	61
20 +	70.0	80.0	93.6	81.1	23.0	53	91
Administration							
0–4	*	*	*	*	*	*	4
5–9	*	*	*	*	*	*	4
10–14	*	*	*	*	*	*	16
15–19	75.0	85.0	100.0	91.1	22.1	46	22
20 +	87.3	110.0	125.0	121.6	70.3	53	61

**Number of respondents was too small to calculate reliable quartiles.*

SALARIES AND PRIMARY WORK ACTIVITY

• Industry employs nearly 30% of all society members holding doctorates. The widest range of both salaries and work activities can be found in this sector.

• Starting salaries in industry do not vary significantly from one primary work activity to the next. Salaries paid to industrial PhDs with less than five years of experience cluster narrowly around $50,000 a year. More PhDs holding entry-level jobs in industry are engaged in applied research than in any other primary work activity.

• At higher levels of experience, primary work activity also appears to have little effect on salary. Individuals engaged in research, development, design, or engineering have remarkably similar rates of compensation throughout their careers. Administration is the one exception to this rule.

• Administrators earn 13–38% more, on average, than their peers outside of administration. Society members with doctorates typically move into administration later in their careers; nearly 80% of all administrators have fifteen or more years of experience.

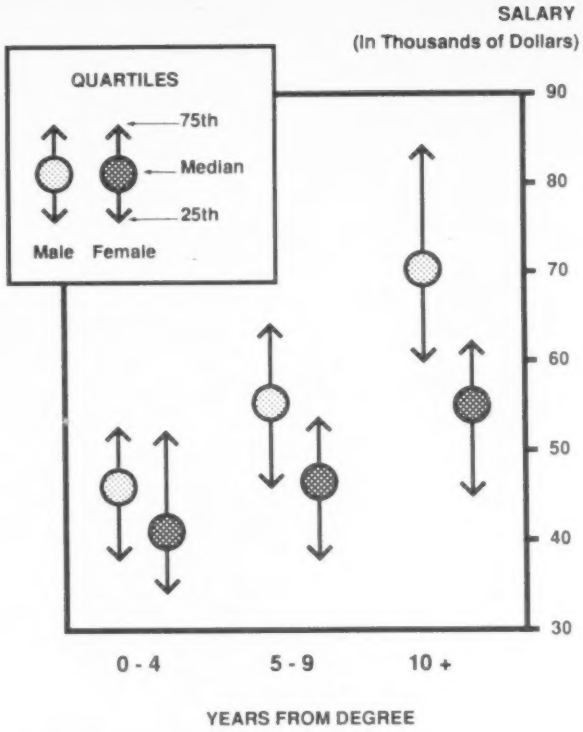

Figure 15. Median salaries in industry by sex and years from degree, 1990.

Table 18. 1990 industrial salaries by sex and years from degree.

	QUARTILE SALARIES (in thousands of dollars) 25th	Median	75th	Median Age	Total Number Known
YEARS FROM DEGREE					
0–4					
Male	38.0	46.0	52.5	31	286
Female	34.3	41.0	52.0	31	49
5–9					
Male	46.0	55.3	64.0	36	379
Female	38.0	46.5	53.5	34	40
10 +					
Male	60.0	70.3	84.0	47	1253
Female	45.0	55.0	62.0	41	55

SALARIES FOR MALES AND FEMALES

• Among society members, only 7% of PhDs, 14% of masters, and 17% of bachelors are women. These figures have grown somewhat since the early 1980s, when women comprised fewer than 5% of PhDs and 10% of masters and bachelors. The American Geophysical Union, which joined the AIP in 1987 and has a relatively high proportion of female members, is responsible for part, but not all, of this increase.

• At all degree levels, men typically earn higher salaries than women. Part of this disparity can be attributed to the fact that men at each degree level are, on average, several years older than women and have therefore been in the workforce longer. Commensurate with their greater experience, men receive higher salaries. However, age and experience do not account entirely for differences in salary. Employment patterns, career paths, and discrimination also influence the extent to which salaries diverge.

• Three-fourths of male society members are PhDs, as compared to 60% of female society members. This difference is responsible, in part, for variations in employment sector by gender. Men are more likely to work in universities, which typically employ PhDs, while a large proportion of women work in secondary schools, which are among the principal employers of lower degree holders. Differences in employer type, however, cannot be entirely attributed to degree level; after controlling for degree,

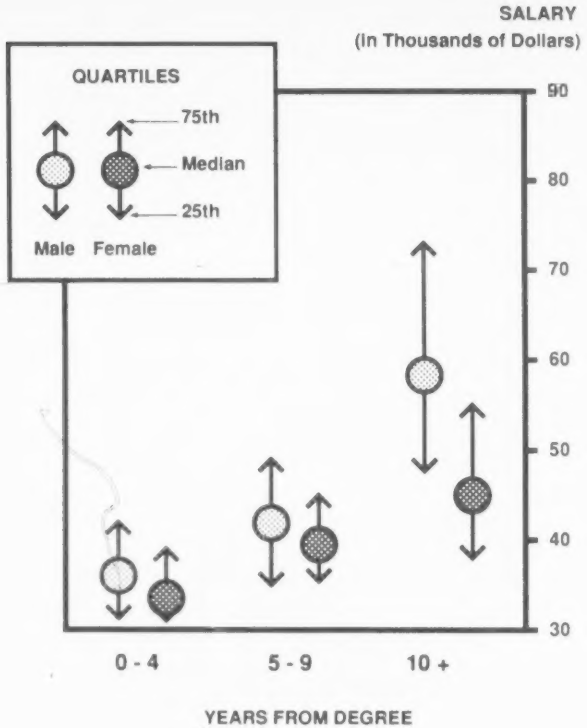

Figure 16. Median salaries in universities by sex and years from degree, 1990.

Table 19. 1990 university salaries by sex and years from degree.[a]

	QUARTILE SALARIES (in thousands of dollars)			Median Age	Total Number Known
	25th	Median	75th		
YEARS FROM DEGREE					
0–4					
Male	31.3	36.0	42.0	33	179
Female	31.0	33.5	39.0	31	30
5–9					
Male	35.0	41.9	49.0	36	271
Female	35.4	39.5	45.0	36	40
10 +					
Male	47.7	58.3	73.0	51	1401
Female	38.0	45.0	55.0	46	77

[a] *Postdoctorates excluded.*

women are still more likely to be high school teachers, whereas men are more concentrated in industrial jobs.

• In industry, the disparity between men's and women's salaries increases with experience. At the lowest level of experience, men's salaries are $5,000 over those of women. This gap widens to $15,300 among individuals ten or more years from degree. Salary differences at entry level can be attributed primarily to the fact that a larger proportion of women hold lower degrees. At higher levels of experience, though, a significant gender gap in wages exists even after variations in age and degree are taken into account.

• As in industry, the largest disparity between men's and women's salaries in academe occurs at the highest level of experience, although differences can be seen at all levels. With a median salary of $58,300, men ten or more years from degree earn salaries 30% above those of women. Some of this difference is due to the fact that men in this group are five years older than women. In addition, a substantially higher proportion of men are full professors, whereas women tend to be concentrated in the lower professorial ranks or research staffs. However, gender differences in neither age nor academic rank are substantial enough to completely account for the gap between men's and women's salaries in the academic sector.

APPENDIX A: GEOGRAPHIC DIVISIONS

NEW ENGLAND
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

MIDDLE ATLANTIC
New Jersey
New York
Pennsylvania

SOUTH ATLANTIC
Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia
Puerto Rico

EAST NORTH CENTRAL
Illinois
Indiana
Michigan
Ohio
Wisconsin

EAST SOUTH CENTRAL
Alabama
Kentucky
Mississippi
Tennessee

WEST NORTH CENTRAL
Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

WEST SOUTH CENTRAL
Arkansas
Louisiana
Oklahoma
Texas

MOUNTAIN
Arizona
Colorado
Idaho
Montana
Nevada
New Mexico
Utah
Wyoming

PACIFIC
Alaska
California
Hawaii
Oregon
Washington

APPENDIX B: TECHNICAL NOTES

Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. Percentiles were not interpolated when the requested quantiles fell a certain fraction into a group of equal values or when fractional weights were used.

Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Students are not included.

Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles. Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the subgroup being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means, and medians can be determined as follows:

Medians:

M_1, *that point below which* p_1^{th} values fall,
M_2, *that point below which* p_2^{th} values fall,

where

$$p_1 = p + Z\left(\frac{p(1-p)}{n}\right)^{1/2}, \quad p_2 = p - Z\left(\frac{p(1-p)}{n}\right)^{1/2},$$

and

$P = 0.5$,
n = sample size,
z = coefficient of confidence, 1.96 at the 95% confidence level.

Means:

$\bar{x} \pm Zs/(n)^{1/2}$, *where*
$\bar{x}$ = the arithmetic mean,
s = standard deviation,
n = sample size, and
Z = coefficient of confidence 1.96 at the 95% confidence level.

Proportions:

$$p \pm Z\left(\frac{p(1-p)}{n}\right)^{1/2}$$

p = sample proportion observed,
n = sample size, and
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Cost-of-Living Index

The cost-of-living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of inter-city cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the all-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.